A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES

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BY

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DECLARATION

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Dedicated

to

my family

&

Teachers

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ABBREVIATIONS

ATT	Anti- Tubercular Therapy
CPT	Child- Pugh Turcotte
HCV	Hepatitis-C Virus
ICU	Intensive Care Unit
INR	International Normalized Ratio
MELD	Model For End- Stage Liver Disease
PTI	Prothrombin Time Index
PTTK	Partial Thromboplastin Time With Kaolin
PVS	Peritoneovenous Shunt
SSI	Surgical Site Infection
TIPS	Transjugular Intrahepatic Porto-systemic Shunt

ABSTRACT

Introduction: Umbilical hernias are common among patients with cirrhosis and uncontrolled ascites. Conservative management can be complicated by bowel incarceration, strangulation and rupture. Such conditions force emergency repair in patients who are then at a greater risk of developing complications in an emergency setting than after elective surgery.

Aim: To assess the safety and efficacy of elective umbilical hernia repair in patients with concurrent liver cirrhosis and ascites prospectively.

Material & Methods: This prospective study was conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitted with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 30th June 2019 and included 10 patients with Child Pugh Turcotte score A & B who underwent elective onlay mesh repair of umbilical hernia.

Results: None of the 10 patients developed the hematoma/ seroma formation in follow up period. 1 out of the 10 patients had post-operative hepatic encephalopathy but survived and another 1 patient had variceal bleeding leading to mortality of the patient 2 months after surgery. There was no peri-operative mortality.

Conclusion: Elective umbilical hernia repair, in patients with liver cirrhosis and ascites, is a safe approach in terms of low morbidity and low mortality. Hence elective repair seems preferable over conservative management or emergency repair of hernia in selected cirrhotic patients.

Keywords: Umbilical hernia, cirrhosis, ascites, bowel incarceration, strangulation.

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INTRODUCTION

Cirrhosis of liver results from the fibrosis of the liver parenchyma which inturn causes portal hypertension, leading to the dramatic complications of esophageal and gastric varices, uncontrolled ascites, or encephalopathy.[1] The main etiological factors of the disease are hepatitis virus infection and alcohol abuse. Up to 20% of cirrhotic patients have either umbilical or inguinal hernias in the course of their disease[2] due to elevated intra-abdominal pressure from ascites, muscle wasting, fascial weakening from nutritional deficiencies[3] and the dilated umbilical vein enlarging the pre-existent supra-umbilical fascial opening in patients with portal hypertension[4], which all contribute to the widening of the umbilical ring.[5] Umbilical hernia is the protrusion of abdominal contents through the anterior abdominal wall near the nevus. Complications of untreated umbilical hernias in cirrhotic patients include bowel incarceration or strangulation, skin ulceration, ascitic fluid leakage and spontaneous rupture. If such a complication is present, there is a high mortality rate after surgical repair.[6] The optimal treatment of umbilical hernia in the setting of cirrhosis poses unique and specific management problems due to the pathophysiology of cirrhotic ascites and still under debate.[7] The prevention and strict control of ascites is the most effective way to avoid development of abdominal wall hernias.[2] Early repair of umbilical hernias in patients with cirrhosis and ascites is safer and can be considered for selected patients. This may avoid increased morbidity and mortality associated with urgent repair later on.[8]

Traditionally, the surgical treatment of umbilical hernia in those patients was avoided because of a significant recurrence rate and postoperative morbidity & mortality.[4] However, conservative treatment is also associated with high mortality rates because of the strong likelihood of emergency situations, such as incarcerated hernias or rupture of the hernia sac.[9-12] There is a lack of high-level, randomized, controlled studies of umbilical hernia patients accompanied by liver cirrhosis to form

the basis of treatment protocols. However, more number of reports are recommending early elective surgery in umbilical hernia patients with liver cirrhosis because surgery- related complications can be reduced with laparoscopic surgery and development of perioperative patient care.[11,13-15]

An umbilical herniorrhaphy in low-risk patients without underlying medical diseases is a simple procedure with very low morbidity and mortality. However, patients with umbilical hernias complicated by liver cirrhosis have an increased likelihood of complications following herniorrhaphy, such as wound complications combined with leakage of ascites, impending liver failure, or recurrence of the umbilical hernia. Patients with liver cirrhosis who undergo surgery with general anaesthesia are expected to have a high morbidity and mortality rate that progressively increases in relation to the severity of pre-operative liver dysfunction.[16,17] Therefore, surgeons often choose not to perform surgery on patients with umbilical hernias complicated by cirrhosis in spite of the simplicity of the procedure. Recent studies have reported improved outcomes and have recommended elective or early umbilical herniorrhaphies in patients with liver cirrhosis.[8,18,19] However, selection of the patient, the optimal timing to surgery, and the method of repair remain controversial.

The increased incidence of umbilical hernia is correlated with the patient's numbers of ascites episodes developed over time, reaching an incidence of 70% in the third episode of ascites.[20]

Uncontrolled ascites can negatively influence recurrence rates and morbidity rates.[21] In addition to the medical treatment of ascites, concomitant peritoneovenous shunting at the time of herniorrhaphy[22,23] and the use of temporary peritoneal dialysis catheters[24] have been shown to reduce recurrence rates by controlling ascites.

A small fraction of patients with large-volume ascites develop the severe complication of a ruptured umbilical hernia, also known as "Flood syndrome," described by Dr. Frank B. Flood in 1961.[25] The surgical

treatment of a ruptured umbilical hernia in a patient with Child-Pugh class C cirrhosis is fraught with short and long-term complications and high mortality.[10]

Several studies address postoperative outcome after umbilical herniorrhaphy in patients with advanced cirrhosis; however, patient series remain small, and little is known regarding survival or need for liver transplantation (LT) requirement subsequent to the immediate perioperative period. As such, recommendations concerning perioperative management of the ascites and advocating more aggressive operative management are limited.[18,26]

Unlike the general population, in which female sex and obesity are risk factors for umbilical hernia, cirrhotic patients who form umbilical hernias are more likely to be men with ascites.[27-29] In the general population with no co-morbidites, acquired umbilical hernia increases in size very slowly.[29] On the contrary, in individuals with intra-abdominal pressure elevated, such as in cirrhotic patients with ascites, umbilical hernia size increases rapidly.[2,30] In addition, ascites is also important in the development of complications in these patients. Ascites may precipitate hernia incarceration of intestine or omentum into the dense fibrous ring at the neck of the hernia.[31-34] Enormous increase of intra-abdominal pressure secondary to tense ascites may also cause pressure necrosis and perforation of the overlying skin followed by evisceration, ascites drainage, and peritonitis.[33,35]

This study was conducted in DMC&H Ludhiana on patients who underwent elective open mesh repair of umbilical hernia in presence of liver cirrhosis & ascites with Child-Pugh Turcotte score of A or B to know the outcome of elective umbilical hernia repair in terms of post-operative complications.

AIMS AND OBJECTIVES

To assess the safety and efficacy of elective umbilical hernia repair in patients with concurrent liver cirrhosis and ascites prospectively.

REVIEW OF LITERATURE

Cirrhosis is an increasing cause of morbidity & mortality in more developed countries, being the 14th most common cause of death worldwide.

Umbilical hernias are common among patients with cirrhosis and uncontrolled ascites.[22,36] Patients with liver cirrhosis and ascites have a risk of 20% of developing an umbilical hernia in the course of their disease.[2]

The rate of complications is high in cirrhotic patients with umbilical hernia and ascites, mainly due to the enormous intra-abdominal pressure that enlarges the hernia rapidly.[11] These complications include infection, incarceration, strangulation, and rupture. Non-operative management of these complications is associated with elevated morbidity and mortality.[8,11,27,32] The mortality rate ranges from 60% to 80% following conservative management of ruptured umbilical hernia and 6% to 20% after urgent herniorrhaphy.[8,27] Therefore, complicated umbilical hernia in cirrhotics with ascites should be corrected urgently.[8,27] Initially, the patient should be subjected to appropriate resuscitation with intravenous fluids and antibiotics to prevent or treat ascitic fluid infection.[27] Sterile dressing is indicated in patients with ascitic fluid drainage or cutaneous infection. After patient stabilization, umbilical herniorrhaphy should be done with sutures.[27,32] Mesh should be avoided to decrease the risk of infection.[27,32] Ascites control is important to reduce complications and hernia recurrence.[11,18,37]

In 1901, Mixter described the case of a 30-year-old woman with an umbilical hernia that ruptured spontaneously and discharged a large quantity of peritoneal fluid. During surgery, herniated omentum was resected and the hernia was repaired. The patient recovered completely. Since this first description, several single case reports and small scattered series have been reported, establishing that umbilical hernia disruption is an unusual but potentially serious complication of hepatic cirrhosis.[38]

In 1960, Baron'0 described the various indications for umbilical hernia repair in 16 cirrhotic patients with ascites. Six patients died after operation, five from advanced hemorrhage and one from liver failure. He postulated that interruption of portosystemic collateral channels in the umbilical region at the time of herniorrhaphy resulted in increased volume and pressure in the coronary-esophageal veins and thus increased the propensity for variceal rupture. In the collected series, variceal hemorrhage occurred after hernia repair in two patients, an incidence of 9%. One of these patients died. Of the patients who did not undergo operation, two developed variceal bleeding following rupture (25%).[39]

Various scores have evolved from time to time to assess the severity of chronic liver disease and to predict the operative risk in patients with chronic liver disease. Child–Pugh score was firstly proposed by Child and Turcotte (1964) in a textbook “Surgery and portal hypertension” to predict the operative risk in patients undergoing portosystemic shunt surgery for variceal bleeding. The primary version of Child–Pugh score included ascites, hepatic encephalopathy (HE), nutritional status, total bilirubin, and albumin.

Pugh et al[40] in 1972 modified the Child–Pugh classification by adding prothrombin time or international normalized ratio (INR) and removing nutritional status. Child–Pugh score has been widely used to assess the severity of liver dysfunction in clinical work.

Table 1- Measures of Child Pugh score

Measure	1 point	2 points	3 points
Total bilirubin (mg/dl)	<2	2-3	>3
Serum albumin (g/dl)	>3.5	2.8-3.5	<2.8
Prothrombin time, prolongation (s)	<4	4-6	>6
Ascites	None	Mild (or suppressed with medication)	Moderate to severe (refractory)
Hepatic encephalopathy	None	Grade I-II	Grade III-IV

Child–Pugh Grade A for scoring 5-6

Child–Pugh Grade B for scoring 7-9

Child–Pugh Grade C for scoring 10-15

The Model For End-Stage Liver Disease (MELD) is a scoring system increasingly being used to assess the severity of chronic liver disease. It was initially developed to predict death within 3 months of surgery in patients who underwent a transjugularintrahepaticporto-systemic shunt (TIPS) procedure[40], and was subsequently found to be useful in determining prognosis and prioritizing for recipient of a liver transplant.[41,42]

MELD= 3.78xln[serum bilirubin (mg/dL) + 11.2xln[INR] + 9.57xln[serum creatinine (mg/dL)] + 6.43xaetiology (0: cholestatic or alcoholic, 1-otherwise)

40 or more — 71.3% observed mortality

30–39 — 52.6% observed mortality

20–29 — 19.6% observed mortality

10–19 — 6.0% observed mortality

<9 — 1.9% observed mortality

There have been several studies implicating high mobidity & mortality rates in patients of cirrhosis undergoing hernia repair.

O'Hara et al in 1975 reported that out of 35 cases who underwent umbilical herniorraphies in patients with cirrhosis of the liver, 27 cases tolerated the surgery well but in eight cases (23%) there were major complications of which six were fatal. The minor complications (three) consisted of a superficial wound infection, wound seroma, and wound hematoma. All responded to local treatment. Two of the major complications were gastrointestinal hemorrhage occurring two and four weeks following surgery. The first occurred in a patient known to have esophageal varices. The second occurred in a patient with varices who was discharged two weeks postoperatively and returned to the hospital with a bleeding episode one month following herniorrhaphy. In both

patients hematemesis was controlled by transfusing one litre of blood. No further treatment was necessary. The immediate deaths (six) occurred from one to nine weeks postoperatively. Three patients died as a result of staphylococcal peritonitis. These patients were operated on an emergency basis because of intestinal obstruction, two of which had strangulated small bowel requiring resection. Multiple paracentesis was carried out preoperatively in one of these patients because of massive ascites and this resulted in contamination of the ascitic fluid. The second patient required multiple paracentesis and thoracocentesis after operation of massive reaccumulation of fluid. At the time of death the ascitic fluid cultured staph aureus, coag.+. The third patient was encephalopathic with signs of hepatic coma prior to operation. The operation was carried out under local anesthesia. The repair was a single layer transverse closure which leaked ascitic fluid and was associated with the development of generalized peritonitis and hepatic coma. The fourth patient had spontaneous rupture of the hernia with extrusion of the omentum. Uneventful repair was followed by sudden unexplained death on the seventh postoperative day. The last two patients were operated upon because of ulceration of the skin with impending rupture. Both died nine weeks following operation from hepatorenal failure.[12]

Leonetti et al reported two deaths out of 39 cirrhotics undergoing umbilical herniorrhaphy, but the breakdown between urgent and elective cases was not reported.[43]

Also Leonetti et al[43] found a higher recurrence rate after umbilical hernia repair in cirrhotic patients with uncontrolled ascites than in cirrhotic patients with controlled ascites or in patients without cirrhosis. Between 1972 and 1982, they identified 15 cirrhotics with functioning peritoneovenous (PV) shunts, 24 cirrhotics without a functioning shunt (three had occluded PV shunts and 21 had no shunt), and 53 patients without cirrhosis who underwent the repair of umbilical hernias. Among the cirrhotic patients, mortality was significantly higher in the group with

uncontrolled ascites (8.3%) than either the group with functioning PV shunts (0%) or in the group without cirrhosis (0%). The recurrence rate was significantly higher in the group with uncontrolled ascites (17%) compared to the group with controlled ascites (0%) and the group without cirrhosis (0%).

Significant reduction in morbidity and mortality has been observed following elective surgery instead of conservative management.

In a collected review of the literature, 30 patients (22 men and eight women) with ruptured umbilical hernia and leakage of ascites have been reported. The average patient age was 51 years, with a range of 29 to 76 years. All patients had demonstrable ascites for an average of 21 months before hernia disruption. Nearly 30% of patients had a previous history of gastrointestinal blood loss. The etiology of cirrhosis included alcohol abuse in 17 patients (57%) and biliary tract disease in one patient (3%); in the remaining 12 cases (40%), no etiology was identified. Signs of cirrhosis and portal hypertension, including gynecomastia, angiomata, and muscle wasting were commonly observed. Ulceration of the skin overlying the hernia was described in 22 of the 30 cases (73%) prior to disruption. Disruption occurred spontaneously in 26 cases; in four other cases, rupture was apparently precipitated by local trauma, coughing, vomiting or esophagoscopy. In 17 cases, a large volume of ascitic fluid escaped following rupture (mean, 7.7 L; range, 1 to 20 L). In seven cases, leakage of fluid was slow and intermittent, and in six other cases, the data was insufficient to determine the rate of fluid loss. In three instances, evisceration of omentum and small bowel occurred; small bowel resection was required in one case.[12,39,44,45]

Kirkpatrick and Schubert reported that compared to before 1975, patient's postoperative mortality rates had decreased and their prognosis had improved and that waiting to perform surgery until complications of umbilical hernia occurred was associated with higher morbidity rates and mortality rates.[32]

Fisher and Calkins in 1978 report that, among 21 patients with cirrhosis undergoing herniorrhaphy, there were no mortalities when the serum albumin levels was above 24 g/L.[45] Since the albumin level is presumably a good measure of hepatic reserve, such a relationship is not unexpected. It had also been suggested that the ability to control ascites may be a prognostic factor. When ascites persisted despite vigorous medical therapy, the mortality and morbidity were 5 and 30% respectively (compared to 0 and 15%, respectively, when it was possible to control the ascites).[45]

Pescovitz reported one operative death in a series of 22 cirrhotic patients, but it is not stated whether this was in an urgent or an elective situation.[46]

Runyon and Juler retrospectively reviewed the records of patients undergoing umbilical herniorrhaphy at their institution between 1973 and 1983. They identified 22 patients who had a history of ascites. There was no mortality, but morbidity consisting of wound infections and leakage of ascitic fluid from the wound occurred in 18% of patients. Five of these patients were lost to follow-up. All patients in this series had only medical control of ascites and, of the remaining 17 patients available for analysis, 11 had uncontrolled ascites at the time of hernia repair. Eight of these patients developed recurrent hernias after an average follow-up of 2 years. Among the six patients who had successful medical control of their ascites, there was only one recurrence.[1]

Slakey et al suggested that the insertion of temporarily peritoneal dialysis catheter at the end of umbilical herniorrhaphy in cirrhotic patients was effective in controlling ascites and reducing the complication rate. This approach has some advantages, such as outpatient care during the postoperative period and easy removal of the catheter.[24] However, peritoneal catheters are associated with a high risk of bacterial infections, which significantly increase mortality and should be discouraged.[47]

Bajaj and Varma reported 5 patients in whom hernias persisted despite multiple mesh repairs (ranging from 3 to 5 per patient).[48] TIPS was considered specifically as therapy for the umbilical hernia; all 5 patients had resolution of their umbilical hernias after TIPS during the follow-up of 6 months to 5 years. The ascites resolved after TIPS: 2 had recurrence of their umbilical hernia as an early indicator of TIPS stenosis, which resolved on dilatation of TIPS.

Koscielny et al proposed a method of placing 2 large bore Robinson drainage tubes for 10-14 days post surgery, to facilitate adequate healing.[49]

Hassan et al in 2014 showed that sublay mesh repair is safe and effective in uncomplicated cases.[50]

Chapman reported an incidence of 10% in patients with liver disease not associated with ascites and one of 24% in similar patients with ascites.[36] In Chapman's series, umbilical hernia was the most common type of hernia (24 of 47 hernias), followed by inguinal, ventral, and epigastric hernias.

Henrikson noted that the overall incidence of hernias among patients with cirrhosis was 16%.[51]

ELECTIVE VERSUS EMERGENCY UMBILICAL HERNIA REPAIR AND ITS COMPLICATIONS IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES

Lemmer et al reported one mortality out of eight patients who underwent urgent operations for ruptured hernias.[10]

A review of papers published by Maniatis and Hunt between 1956 and 1990 found a mortality rate of only 2% in the non-urgent setting, while the mortality rate was 14% with repair due to complications carried out as an emergency.[52]

The data from a series reported by Belghiti et al showed that, as the severity of the cirrhotics increased, patients were less likely to be selected for elective herniorrhaphy for uncomplicated hernias.[2]

According to data reported by Belghiti and Durand[2], patients with more severe hepatic cirrhosis are less likely to undergo elective surgery. This is important because the incidence rate of complications and the mortality rate increase dramatically in patients with Child's class C compared to those with class A disease.

Also Belghiti et al compared of 26 cirrhotics (half of whom had ascites preoperatively) to 14 cirrhotics who had umbilical hernia repair and concomitant PVS insertion. The follow up duration was at least 6 months in all cases. Of the 14 cirrhotics who underwent concomitant PVS insertion, two required shunt removal due to postoperative complications and two shunts became occluded. In each of these four patients, ascites and the hernia recurred. In all, there were 14 patients who developed recurrent ascites, and ten of these (71%) developed a recurrent umbilical hernia. In contrast, there was only one recurrence in the 26 patients (4%) who did not develop recurrent ascites.[21]

Marsman et al in 2007 had compared elective surgical repair (n = 17) with expectant treatment (n = 13) in cirrhotic patients with umbilical hernia and ascites. The authors reported that expectant treatment was associated with elevated morbidity and mortality. Hospital admission for hernia incarceration was observed in 10 of 13 patients (77%), of which 6 needed emergency herniorrhaphy. Two patients (15%) who were subjected to expectant treatment died from hernia complications. Conversely, no complications or hernia recurrence was recorded in 12 of 17 patients (71%) who underwent elective herniorrhaphy.[11]

A study published in 2013 by Banu Petrisor et al[53], in which they assessed 22 consecutive cases of cirrhosis patients treated for complicated umbilical hernia during January 2008 and December 2012. According to Child-Pugh-Turcotte score 4 patients were with score A, 11 patients with B and 7 patients with score C. The 22 patients of the study group were followed and quantified for postoperative complications, which occurred in a period of 30 days. There were 5 deaths, accounting for

22.2%. The complications recorded in patients of Child A class were mild, as grade 1, according to Clavien classification. A seroma and a wound infection have been noted, both requiring only a local treatment. All the patients in Child B class had complications at all levels. Two of them (18.2%) were grade 1 - one hematoma and one wound infection. Four (36.4%) grade 2 complications were recorded in this group. One patient presented postoperative melena caused by erosive gastritis, requiring blood transfusion associated with gastric antisecretory and hemostatic treatment. One patient presented a dynamic ileus, requiring the installation of a nasogastric tube and correcting electrolyte imbalance. Bowel movements resumed in the 5th postoperative day. Two patients had extensive wound infections and required antibiotics therapy. Grade 3 complications recorded in Child B stage patients were: one upper GI bleeding with variceal etiology that required endoscopic hemostasis, and one operative wound dehiscence, which was solved by secondary suture practiced under local anesthesia (18.2%). There were two severe complications (18.2%) in Child B patients group, such as grade 4, represented by acute renal failure - 1 case and hepatic failure - 1 case both requiring resuscitative measures in the intensive care unit. One death (9%) was registered in this group. Out of the 7 patients in Child class C, four died (57.1%) and there were three complications: one severe (14.3%) represented the hepatorenal syndrome, one grade 3 -wound dehiscence resolved by secondary suture and one grade 2 - a severe infection that required antibiotics. No complications caused by operative gestures applied to saccular contents in strangulation cases were recorded. The two cases that required ileal loop resection with mechanical anastomosis, both in Child B stage, recorded 2 complications both of grade 2 - one dynamic ileus and one wound infection. There were no hernia recurrences during patients' follow-up.

A retrospective study[18] evaluated the outcomes of elective and emergency herniorrhaphy in 1294 patients without cirrhosis and 127

(8.9%) with cirrhosis. Patients with cirrhosis were more likely to undergo emergency repair (26.0% versus 4.8%, P < 0.0001) and concomitant bowel resection (8.7% versus 0.8%, P < 0.0001), to return to the operating room (7.9% versus 2.5%, P = 0.0006) and had an increased postoperative length of stay (4.0 versus 2.0 days, P = 0.01). In the group with emergency repair, cirrhosis (odds ratio, 4.4; 95% confidence interval, 1.3–14.3) was strongly associated with post-operative complications.

Another group from Egypt reported[54] on 23 consecutive patients operated upon on an emergency basis for the treatment of complicated umbilical hernias associated with liver cirrhosis and ascites. The hernia was complicated by strangulation in 11 patients and ascitic fluid leak in 12 patients. Patients were assigned randomly. In the first group (n = 12), peritoneal drainage was placed at the end of operation, but no drainage was applied in the second group (n = 12). Postoperative wound dehiscence occurred in 4 patients in group 2 (23.5%) but in none of group 1. The overall mean hospital stay was significantly lower in patients of group 1 (P < 0.0 1). Hernia recurrence occurred in 1 patient in group 1 and 3 in group 2 (follow-up, 19 ± 3 months).

A study published by Byung Chul Yu et al[35] in 2015 on 18 patients who underwent surgery were aged between 46 and 82 years, and the mean age of the patients was 62.9 years. Eleven patients were males, and seven were females. Two of the patients were classified as Child’s class A, 11 as Child’s class B, and five as Child’s class C. Four patients underwent emergency surgery, out of which two cases due to perforation of the hernia sac and the other two cases due to incarceration. Of the 18 patients who underwent surgery, four (22%) experienced a recurrence, three (17%) developed seroma at the surgical sites, one (5%, Child's B) experienced hepatic coma, and one (5%, Child's C) showed postoperative variceal hemorrhage. All of these events occurred after emergency surgery. Uncontrollable ascites were responsible for the recurrences in the

four cases during a median follow-up period of 19.5 months (range, 3 to 33 months). There was no perioperative mortality.[35]

HERNIA REPAIR IN CANDIDATES TO LIVER TRANSPLANTATION

Candidates undergoing liver transplant may undergo umbilical herniorrhaphy during the transplant operation. Patients who have a good perspective to be transplanted within 3-6 months, herniorrhaphy should be done during transplantation.[11] Hernia repair should not be delayed due to the risk of post-transplant intestinal strangulation of an obstructed umbilical hernia.[2,11,30]

During umbilical hernia repair ligation of a large patent umbilical vein may cause acute liver failure due to acute portal vein thrombosis or embolization which leads to emergency liver transplantation.[30,55] The umbilical hernia may be repaired at the end of liver transplantation either from inside the abdomen through the same incision employed for the transplantation or through an additional para-umbilical incision.[30] In a retrospective study, de Goede et al[30] reported the only study of the literature comparing the two incisions. The recurrence hernia rate was higher in the same incision group than in the separate incision group (40% vs 6%).[30] The number of patients was small in this retrospective study to allow recommendations.

HERNIA REPAIR WITH OR WITHOUT MESH

Modern surgical hernia repair depends increasingly on synthetic mesh for reconstruction of the abdominal wall. The use of synthetic mesh for the elective repair of umbilical hernia in cirrhotic patients proved to be safe, simple, and effective technique.[42]

Due to high recurrence rate after repair of abdominal hernias, including umbilical hernia, in cirrhotic patients, prosthetic mesh repair has been introduced and revolutionized hernia surgery.[50,56] Mesh repair of hernia compared with suture repair reduces hernia recurrence rate, but increases the risk of some complications like infection, seroma, mesh erosion, and intestinal adhesion, obstruction, and fistula formation.[55-58]

Several studies have demonstrated that elective mesh umbilical hernia repair in cirrhotic patients with ascites is simple, safe, effective, and reduce hernia recurrence markedly.[11,20,59] However, many surgeons are still reluctant to employ mesh for hernia correction in these patients because of the risk of wound complications.[8,59] A significant complication in this group of patients is ascites leakage from the wound, which leads to increased possibility of wound and mesh infection, followed by need of mesh removal.[56] In a recent randomized study, 80 cirrhotic patients subjected to umbilical hernia repair were divided into two groups, with a follow-up of 6 to 28 months.[57] Hernia recurrence rate was lower in the group with mesh repair of hernia as compared to the group without mesh in which the hernia repair was done by conventional fascial suture (14.2% vs 2.7%).[20] In this study, surgical site infection was more likely to occur in the mesh group than in the group without mesh, even though no patient needed mesh removal.[27] No mesh exposure or fistulas were observed in this series. Techniques of mesh placement include onlay, inlay, sublay, and underlay.[56,58] In the onlay repair, the mesh is sutured on external oblique fascia, after dissection of the subcutaneous tissue and closing of the fascia.[56] In the inlay technique, the mesh is placed in the hernia defect and sutured circumferentially to the edges of the fascia.[56] In the sublay procedure, the mesh is inserted in the preperitoneal space or retro-rectus.[56] In the underlay procedure, the mesh is placed intraperitoneally and fixed to the abdominal wall, usually with tackers.[56] The risks of complications are related to the space in which the mesh is placed.[56] In the onlay technique, wound complications are more frequent, such as seroma, hematoma, ascites drainage, and infection of the surgical incision and mesh. This is due to the extensive detachment of subcutaneous tissue from the fascia, which typically creates a dead space between the mesh fixed on the fascia and the subcutaneous tissue. At present, inlay repair is used only occasionally due to high wound infection and recurrence rates.[57] Wound complications are less common in the sublay

and underlay mesh repair techniques because the mesh lies quite deep in the preperitoneal space and intraperitoenally respectively and therefore distant from the subcutaneous tissue and skin.[50,56,58] In the underlay technique, the mesh is in contact with abdominal contents and therefore is subjected to complications, such as intestine adhesion, obstruction, erosion, and fistula.[50,56,59,60] For open surgery, the best abdominal wall layer to place the mesh is still controversial.[28,56,59,61] For laparoscopic umbilical herniorrhaphy, the mesh is routinely inserted intraperitoneally and fixed to the abdominal wall.[50,57,58] At present, countless types and brands of mesh for hernia repair are available. They may be absorbable and permanent synthetic meshes, allograft material, and xenograft material. The selection is based on multiple factors like type of hernia, presence of infection, location or space of mesh placement, cost and surgeon's preference. The most common mesh used in onlay, inlay, and sublay techniques is the polypropylene mesh.[50,57,59] In underlay technique, synthetic meshes with different coatings or composite meshes are preferred to avoid intestine adherence, occlusion, and fistula.[58,59,61]

OPEN OR LAPAROSCOPIC HERNIA REPAIR

The first laparoscopic umbilical hernia repair was described by Sarit et al [28] in 2003 in a patient with liver cirrhosis complicated with strangulated hernia. Several studies have documented the advantages of the less invasive laparoscopic access compared with the open surgical approach to treat umbilical hernia in cirrhotic patients.[13,50,57] The laparoscopic umbilical herniorrhaphy is a minimally invasive and tension-free procedure in which a mesh is placed in underlay manner.[35,62] By minimizing the access incision, the laparoscopic approach reduces postoperative pain, recovery time, and morbidity.[13] One possible disadvantage of laparoscopic herniorrhaphy is the higher cost, mainly of the equipment and material.[8,57,58,63,64] As mentioned earlier, expansive synthetic meshes with different coatings or composite meshes are needed for laparoscopic hernia repair in order to avoid intestine adherence, occlusion, and fistula.

Although, several studies have demonstrated higher costs of laparoscopic abdominal hernia repair, there is no specific study on cost associated with laparoscopic umbilical herniorrhaphy in cirrhotic patients.[28,60,63,64] Considering the postoperative advantages of laparoscopic approach, additional studies are essential to establish the cost-effectiveness of umbilical herniorrhaphy in cirrhotics.[8,62] The laparoscopic approach has been also used for complicated umbilical hernia in cirrhotics.

Sarit et al[28] performed laparoscopic repair for a strangulated umbilical hernia with refractory ascites successfully by releasing the incarcerated bowel loops and fixing a mesh. Some technical information is important to know about in laparoscopic umbilical herniorrhaphy for cirrhotic patients with ascites to avoid complications. Oblique insertion of trocars into abdominal wall may avoid postoperative ascitic fistula.[28] Angulation of trocar insertion allows the layers of the abdominal wall to overlap and prevents ascitic drainage. To prevent the hemorrhage, reduction of incarcerated umbilical hernia contents should be done meticulously due to the close proximity and adherence of umbilical varices.[31]

MATERIALS AND METHODS

This prospective study was conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitted with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 31st March 2019 and after that 3 months follow-up upto 30th June 2019.

SOURCE OF DATA

Patients came in Department of Surgery or Department of Gastroenterology of Dayanand Medical College and Hospital with umbilical hernia in presence of liver cirrhosis and ascites.

METHOD OF COLLECTION OF DATA

Inclusion Criteria:

- Patients of age group 18-60 years presented with uncomplicated umblical hernia in presence of liver cirrhosis and ascites and scheduled for elective hernia repair with Child- Pugh Turcotte score A & B.

Exclusion Criteria:

- Umbilical hernia in presence of liver cirrhosis and ascites complicated by obstruction, strangulation, skin necrosis and ascites leak.
- Age <18 years or >60 years.
- Patients with Child- Pugh Turcotte score C.

METHODS OF COLLECTION

1. All patients presented to DMCH Ludhiana fulfilling the inclusion and exclusion criteria were included in the study.
2. Patients were educated about the study and only those patients consenting to participate in the study were included. Written informed consent was taken from every participant included in the study.
3. Database collection included documentation of medical history, age, sex, vital signs, history of nicotine and alcohol use, history of chronic steroid use, history of diabetes mellitus, history of chronic obstructive pulmonary disease, cardiovascular co-morbidity, viral

markers, hemogram, serum bilirubin levels, serum albumin levels, blood urea levels, serum creatinine, PTI/INR, PTTK, hepatic encephalopathy, Child Pugh Turcotte classification, MELD score, presence of hernia strangulation& incarceration, duration, size of defect, overlying skin, contents whether fluid/ omentum or bowel.

4. USG abdomen was done for size of defect, presence of any dilated umbilical veins, contents and ascites.
5. Patient with Child Pugh Turcotte score of A or B underwent elective umbilical hernia mesh repair after optimization of ascites (with diuretics and albumin), controlling the coagulation parameters and complete preanaesthetic check up.
6. Hernia was repaired through vertical incision. Sac was opened at neck. Contents were reduced back to abdominal cavity followed by excision of sac. After defining the hernial defect, the defect was closed vertically, using Prolene No. 1 sutures, with interrupted sutures at distance of 1 cms from each other and 1.5 cms from the linea alba . A light weight, large porous, polypropylene mesh was used for onlay mesh repair with minimum of 5 cms extending all around the defect. Mesh was fixed with Prolene 2-0. Size of mesh was decided on the basis of size of hernial defect. Ligation of any dilated veins if required was done intraoperatively. All efforts were made intraoperatively to prevent drainage of ascites. Intraoperative complications if any were managed accordingly and noted. A Drain tube was put subcutaneously to prevent seroma formation and removed when last 24 hours drain output was less than 20ml.
7. Post operatively need of ICU care, duration of indwelling drain, return of bowel activity and duration of hospital stay was noted.
8. Post-operative CPT Score and MELD Score was evaluated and any increase in CPT or MELD score postoperatively was noted.

9. Outcome of the patients was noted on follow up at interval 0-7 days, 1 month and 3 months for following post-operative complications:
    Hematoma/ Seroma formation
    Transient ascitic fluid leakage
    Wound infection & dehiscence
    Recurrence of hernia
    Variceal bleeding
    Hepatic encephalopathy
10. Any Mortality up to 30 days was recorded.
11. End point of study was at follow up of 3 months after surgery.

NUMBER OF CASES/TIME PERIOD OF STUDY

The study was conducted at Dayanand Medical College and Hospital, Ludhiana from 1st Jan 2018 to 31st March 2019 and after that 3 months follow-up upto 30th June 2019.

OUTCOME

1. Intra-operative and Post-operative complications.
2. Post-operative CPT Score and MELD Score.
3. Post-operative mortality.

STATISTICAL ANALYSIS

Data was described in terms of range; mean± standard deviation (±SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations were done using SPSS (Statistical Package for the Social Science) 17 version statistical program for Microsoft windows.

OBSERVATIONS AND RESULTS

This prospective study was conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitted with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 30th June 2019. Total 17 patients underwent umbilical hernia repair in background of liver cirrhosis and acsites during this time period. This study was conducted in 10 patients who underwent elective onlay mesh repair of umbilical hernia in presence of liver cirrhosis and ascites. Rest 7 patients were excluded due to emergency nature of surgery.

AGE GROUP

Table 2- Age group of the patients

AGE GROUP	No. of cases	Percentage
< 50	2	20.0%
> 50	8	80.0%
Total	10	100.0%

8 out of 10 patients included in this study belong to the age of 50-60 years. The mean age was 51.7 years.

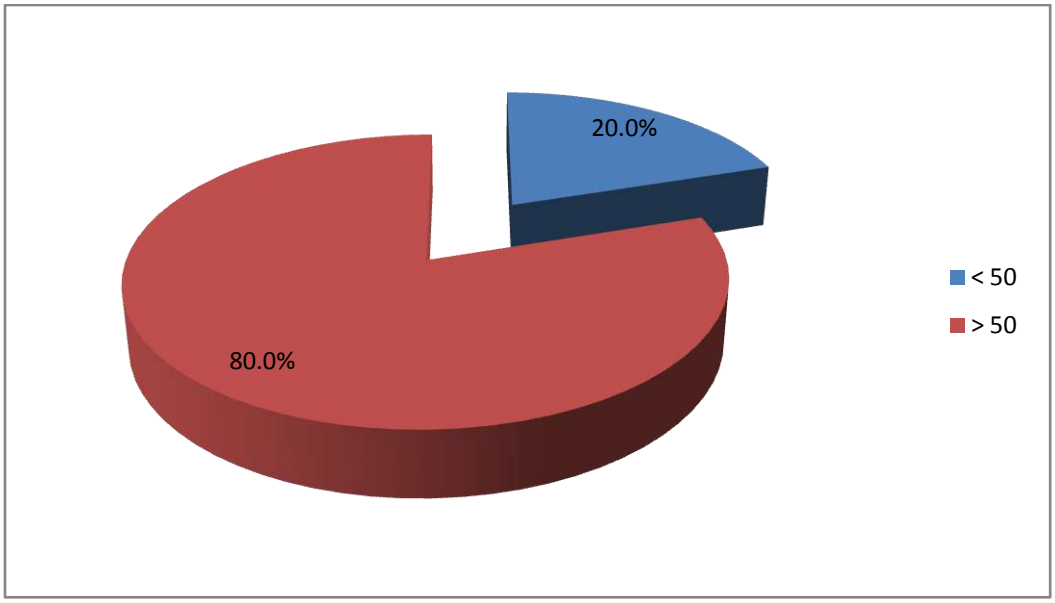

Figure 1- Age group of the patients

GENDER

Table 3- Gender of the patients

SEX	No. of cases	Percentage
FEMALE	3	30.0%
MALE	7	70.0%
Total	10	100.0%

More than 2/3rd of the patients included in study were males.

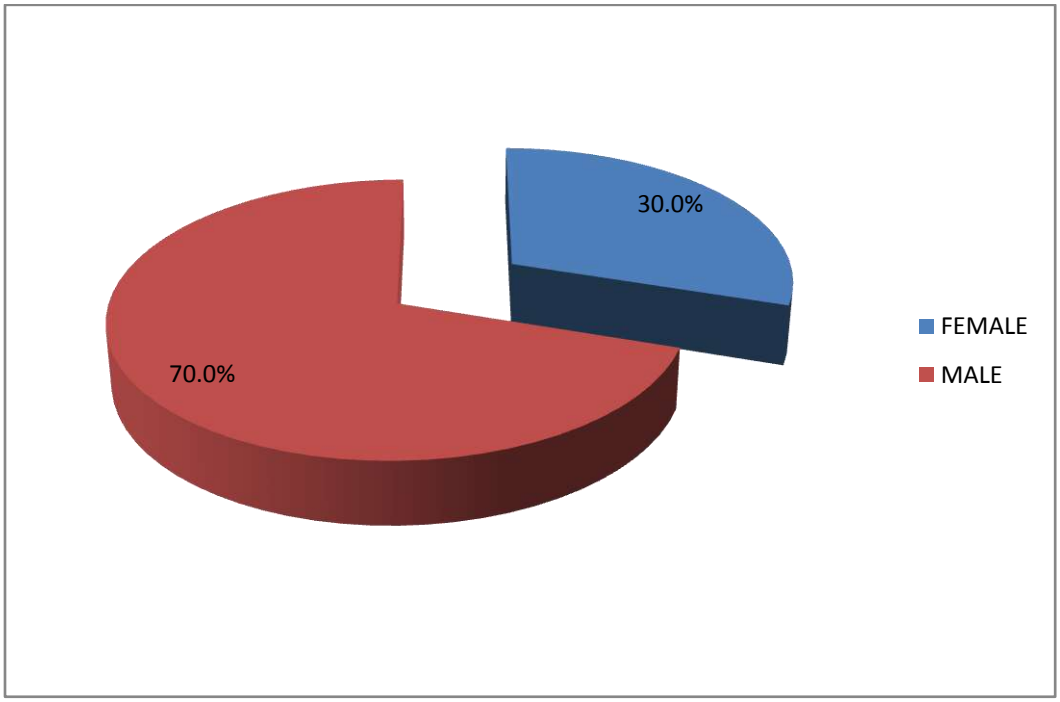

Figure 2- Gender of the patients

DURATION OF UMBILICAL HERNIA

Table 4- Duration of umbilical hernia

DURATION	No. of cases	Percentage
< 2 MONTHS	3	30.0%
2 MONTHS - 1 YEAR	4	40.0%
> 1 YEAR	3	30.0%
Total	10	100.0%

7 out of 10 patients underwent elective umbilical hernia repair within one year of the appearance of umbilical hernia.

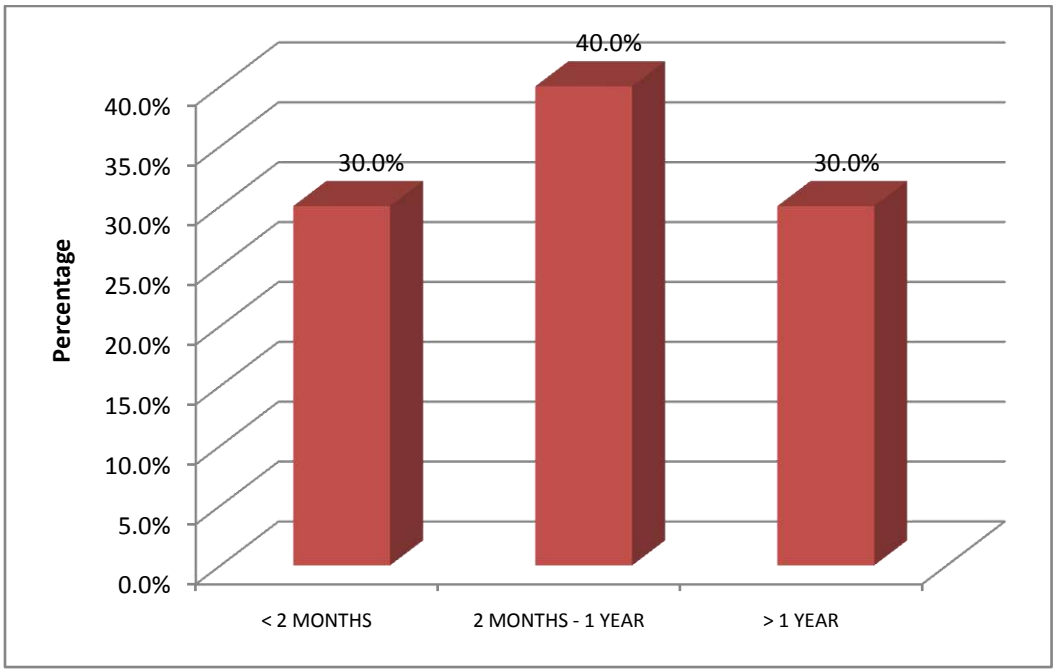

Figure 3- Duration of umbilical hernia

CO-MORBIDITIES

Table 5- Associated Co-morbidities

CO-MORBIDITY	No. of cases	Percentage
DIABETES	1	10.0%
HYPERTENSION	2	20.0%
HYPOTHYROIDISM	1	10.0%
TUBERCULAR ASCITES & ON ATT.	1	10.0%
NONE	6	60.0%

1 patient was having both Diabetes as well as Hypertension as co-morbid conditions.

ALCOHOL INTAKE

Table 6- History of alcohol abuse

ALCOHOL ABUSE	No. of cases	Percentage
CHRONIC ALCOHOLIC	2	20.0%
REFORMED ALCOHOLIC	5	50.0%
NON ALCOHOLIC	3	30.0%
Total	10	100.0%

7 out of 10 patients were chronic alcoholic. However, 5 of them were reformed ones.

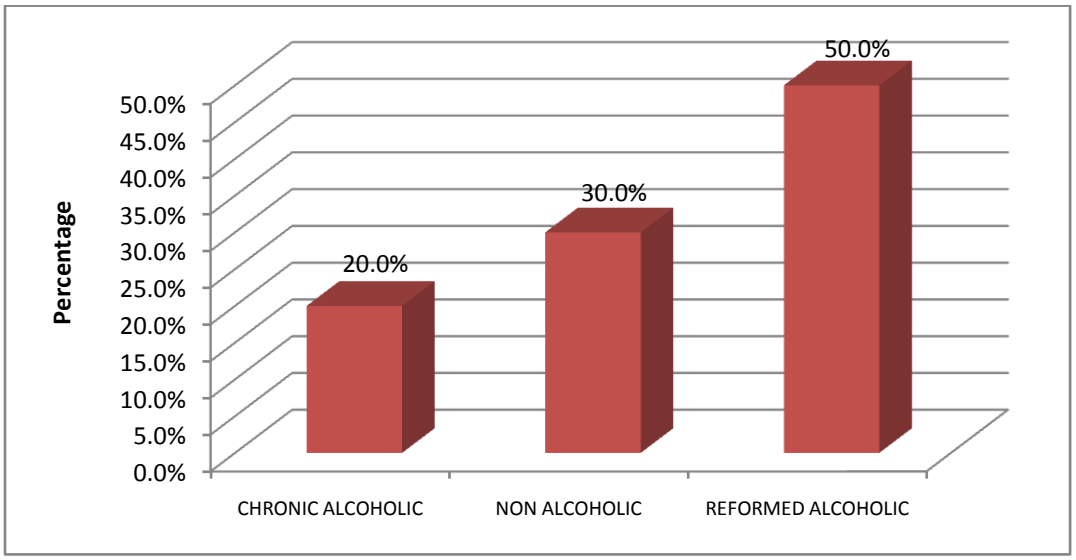

Figure 4- History of alcohol abuse

ETIOLOGY OF CIRRHOSIS

Table 7- Etiology of cirrhosis

ETIOLOGY OF CIRRHOSIS	No. of cases	Percentage
ALCOHOL RELATED	5	50.0%
HCV RELATED	3	30.0%
ALCOHOL & HCV RELATED	2	30.0%
Total	10	100.0%

7 out of 10 patients had Alcohol related cirrhosis of liver, out of which 2 patients were also have HCV related cirrhosis of liver.

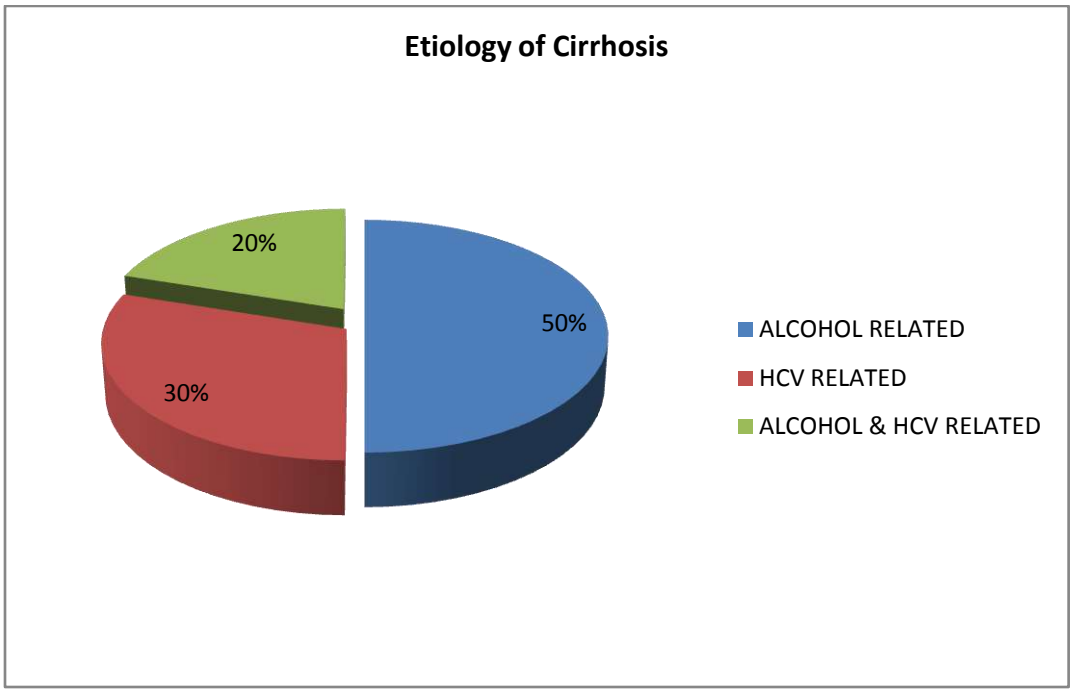

Figure 5- Etiology of cirrhosis

HERNIAL DEFECT SIZE

Table 8- Size of hernia defect

SIZE OF HERNIA DEFECT	No. of cases	Percentage
<2 CMS.	1	10.0%
2-4 CMS.	8	80.0%
>4 CMS.	1	10.0%
Total	10	100.0%

90% patients had hernial defect size of <4 cms.

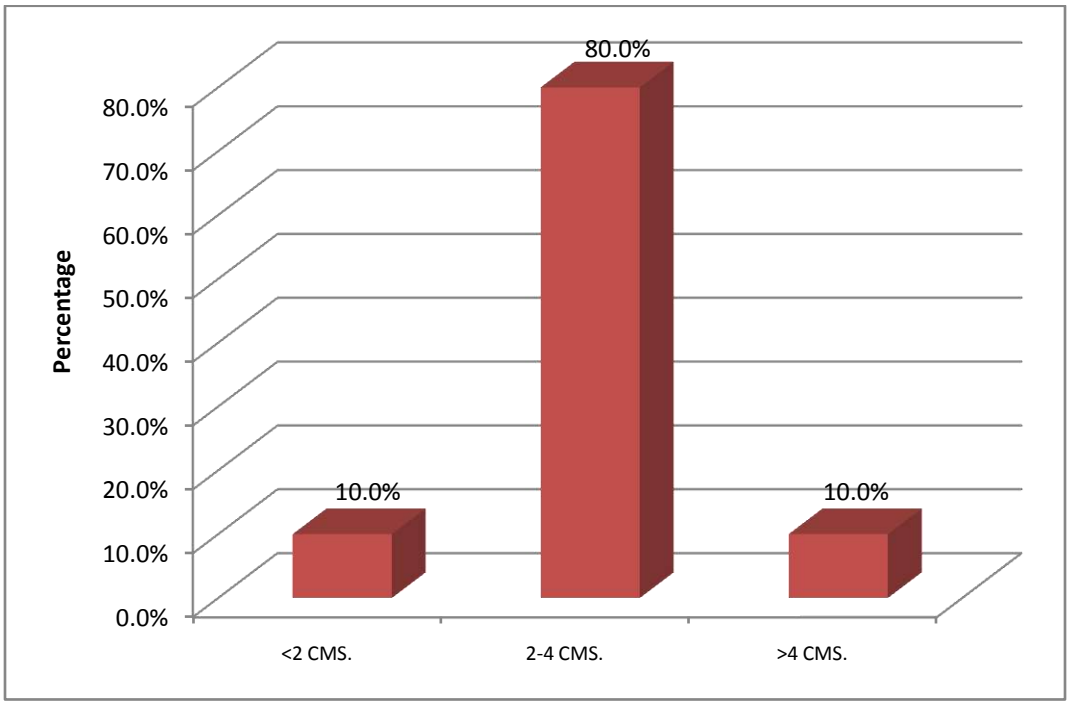

Figure 6- Size of hernia defect

ESOPHAGEAL VARICES

Table 9- Esophageal varices

ESOPHAGEAL VARICES	No. of cases	Percentage
PRESENT	2	20.0%
ABSENT	8	80.0%
Total	10	100.0%

2 out of 10 patients were having Esophageal varices pre-operatively on Upper Gastro-intestinal Endoscopy.

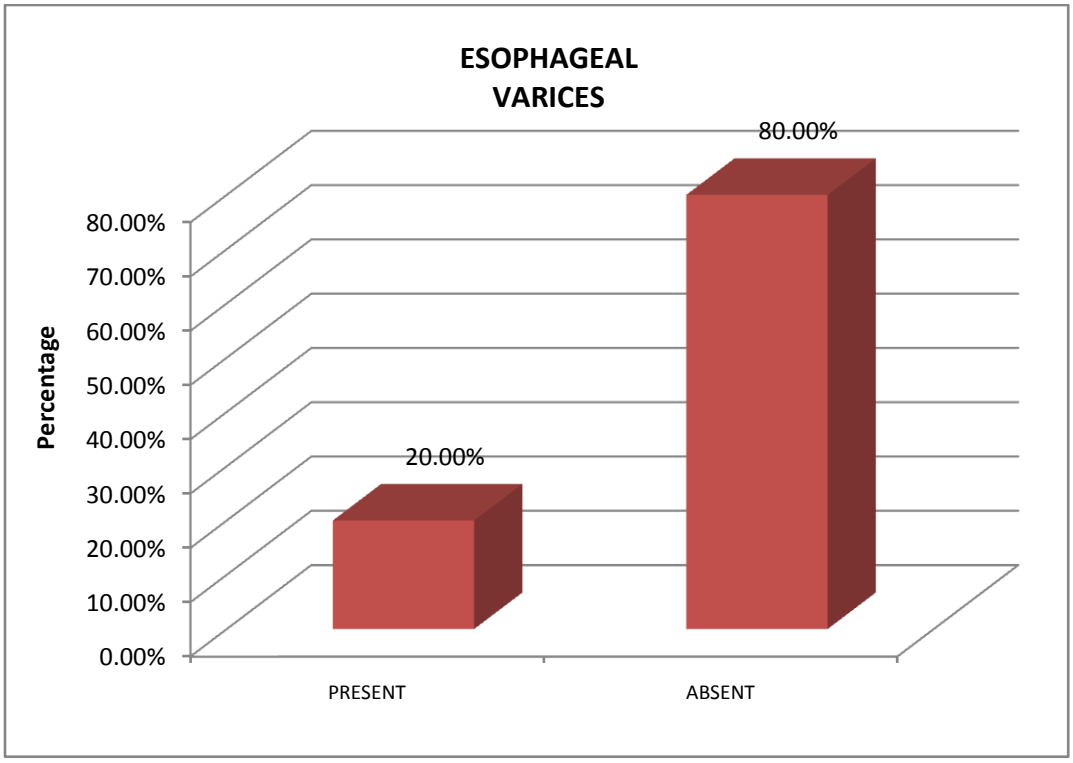

Figure 7- Esophageal varices

CHILD PUGH TURCOTTE SCORE

Table 10- Pre-operative CPT Score

PRE-OPERATIVE CPT SCORE	No. of cases	Percentage
CLASS A	1	10.0%
CLASS B	9	90.0%
Total	10	100.0%

In this study, 1 patient had pre-operative CPT score of 6, i.e., class A. 90% patients had Class B cirrhosis according to CPT score. 3 out of the 10 patients had pre-operative CPT score of 7 and rest 6 patients had pre-operative CPT score of 8. The pre-operative mean CPT score was 7.5.

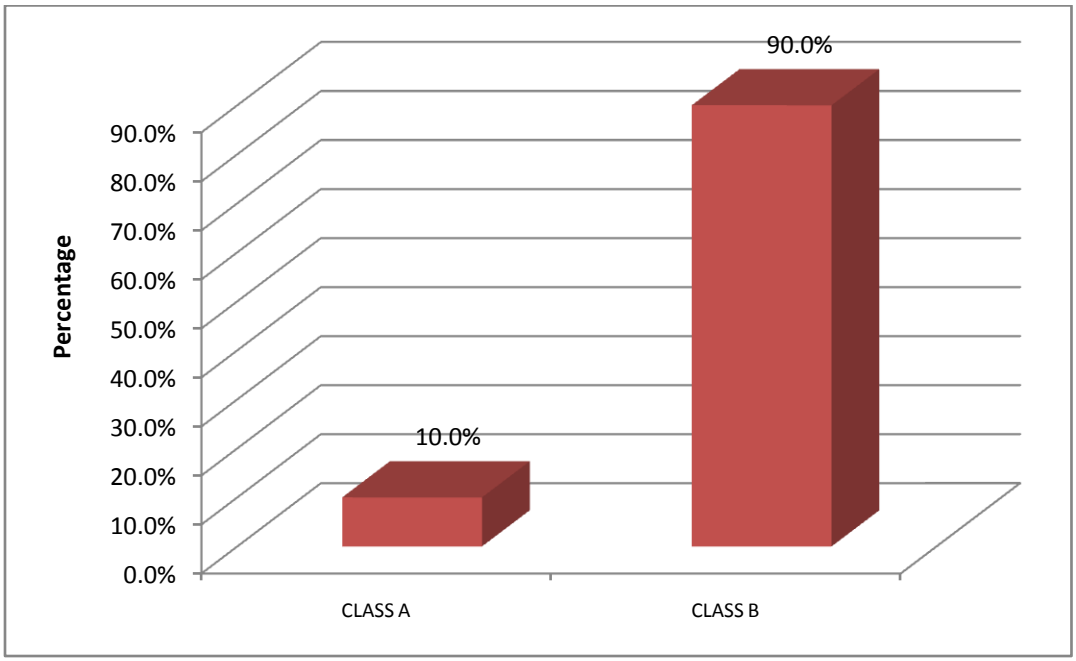

Figure 8- Pre-operative CPT Score

Table 11- Post-operative CPT Score

POST-OPERATIVE CPT SCORE	No. of cases	Percentage
CLASS B	9	90.0%
CLASS C	1	10.0%
Total	10	100.0%

2 out of the 10 patients had deterioration in post-operative CPT score as compared to the pre-operative CPT score. 1 patient from pre-operative CPT class A deteriorated to post-operative class B but survived. Another one patient deteriorated from pre-operative CPT class B to post-operative class C due to portal hypertension which lead to variceal bleeding after 2 months and subsequently died. This patient died due to liver failure more than 30 days after surgery & hence not peri-operative mortality.

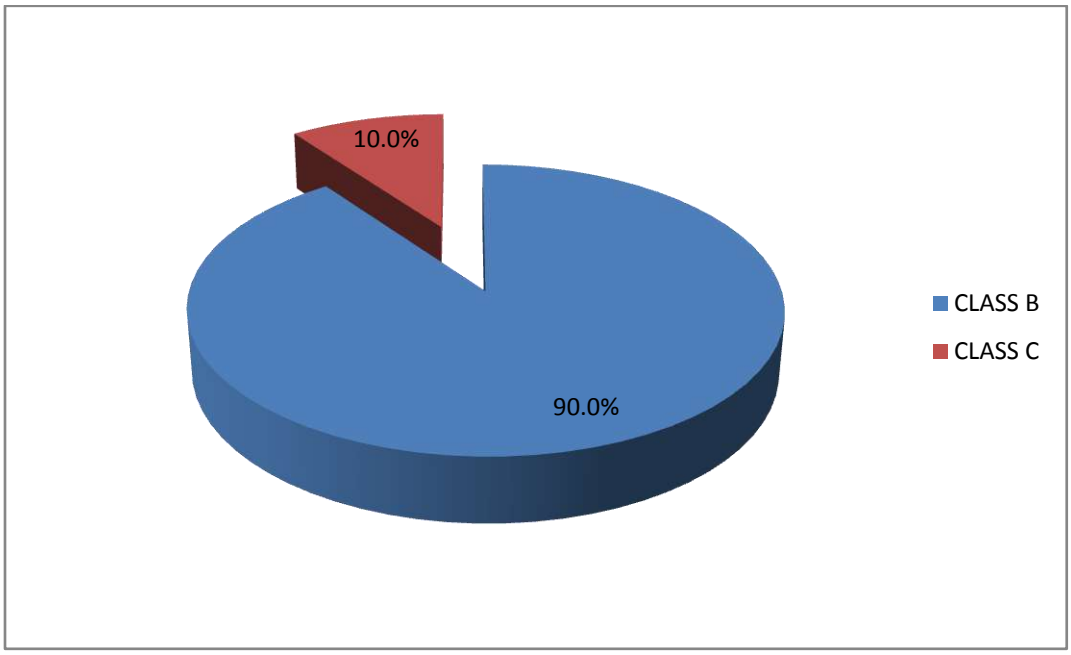

Figure 9- Post-operative CPT Score

Table 12- Comparison of pre-operative & post-operative CPT Score

CPT Score	Minimum	Maximum	Mean
Pre-operative	6	8	7.5
Post-operative	7	10	8.2

There is deterioration of mean CPT score from 7.5 to 8.2 in post-operative period.

MELD SCORE

Table 13- Pre-operative MELD Score

PRE-OPERATIVE MELD SCORE	No. of cases	Percentage
<20	9	90.0%
>20	1	10.0%
Total	10	100.0%

Patients included in this study with liver cirrhosis & ascites had pre-operative MELD score of minimum 10 and maximum of 21 with mean 14.8.

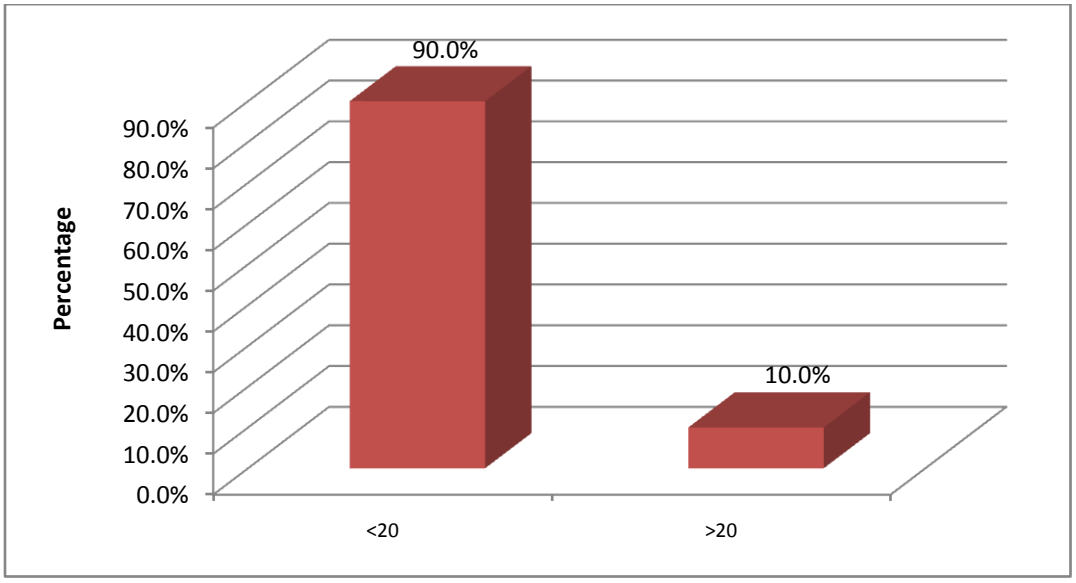

Figure 10- Pre-operative MELD Score

Table 14- Post-operative MELD Score

POST-OPERATIVE MELD SCORE	No. of cases	Percentage
<20	7	70.0%
>20	3	30.0%
Total	10	100.0%

Patients included in this study had post-operative MELD score of minimum 11 and maximum of 25 with mean score of 15.7 (as compared to pre-operative mean MELD score of 14.8).

Patient with deterioration of pre-operative CPT score from class B to post-operative CPT class C had deterioration of pre-operative MELD score from 18 to post-operative 21 and had mortality.

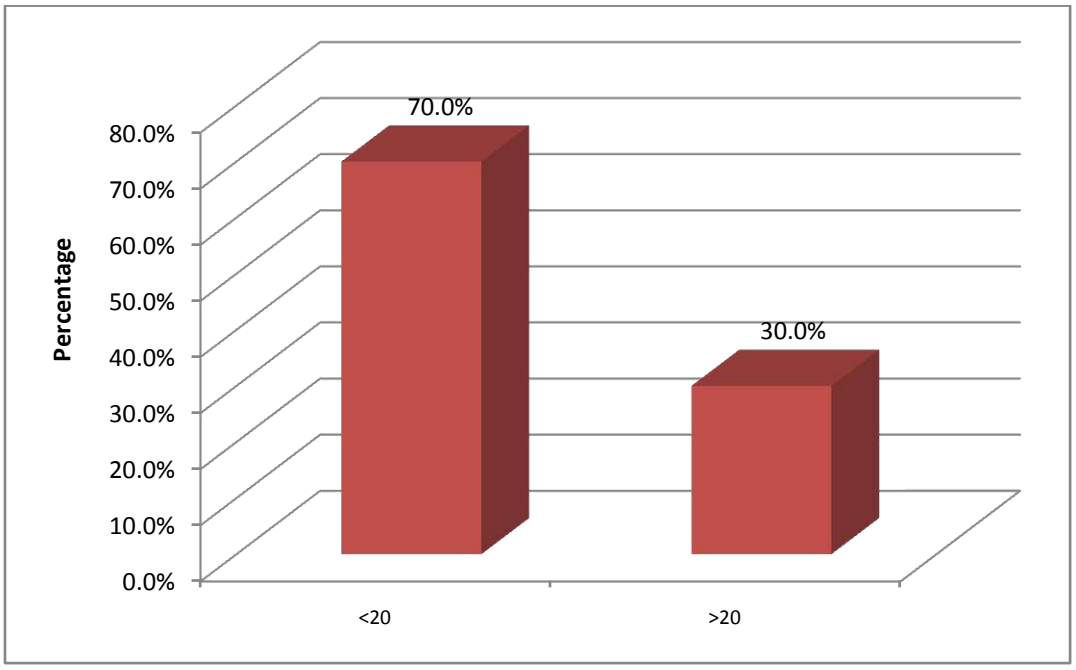

Figure 11- Post-operative MELD Score

ANAESTHESIA

Table 15- Type of Anaesthesia given

TYPE OF ANAESTHESIA GIVEN	No. of cases	Percentage
GENERAL ANAESTHESIA	8	80.0%
LOCAL ANAESTHESIA	2	20.0%
Total	10	100.0%

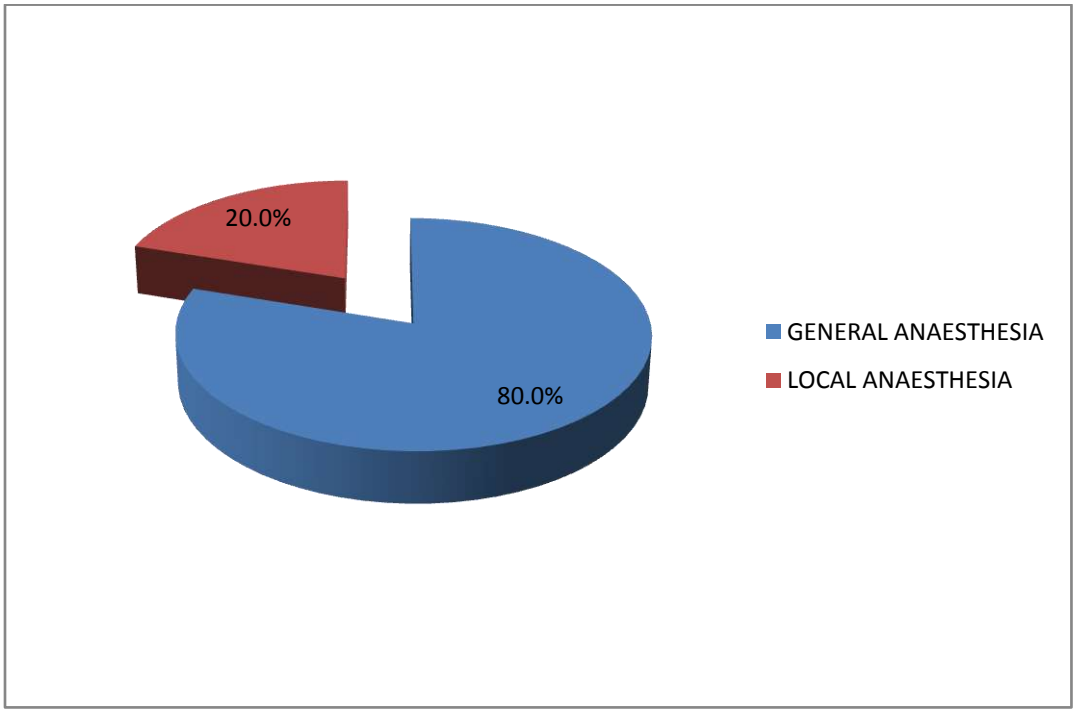

Figure 12- Type of Anaesthesia given

DURATION OF SURGERY

Table 16- Time duration of surgery

TIME DURATION	No. of cases	Percentage
<60 MINS.	1	10.0%
60-90 MINS.	6	60.0%
>90 MINS.	3	30.0%
Total	10	100.0%

Duration of surgery varied from 50 minutes to 2 hour 30 minutes with average duration of 96.5 mins.

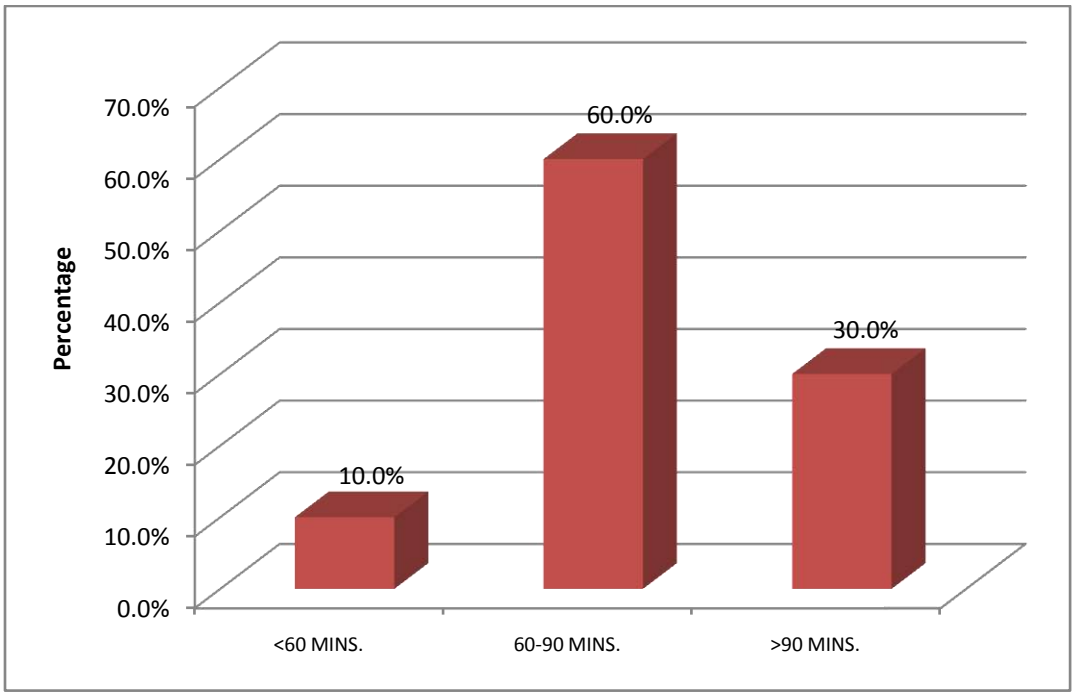

Figure 13- Time duration of surgery

INTRA-OPERATIVE ASCITIC LEAK

Table 17- Intra-operative ascitic leak

ASCITIC LEAK	No. of cases	Percentage
NONE	5	50.0%
<500 ML	2	20.0%
>500 ML	3	30.0%
Total	10	100.0%

2 patients had minimal ascites leak intra-operatively. 3 patients had an intra-operative ascites leak of 500 ml, 1000 ml and 1500 ml respectively.

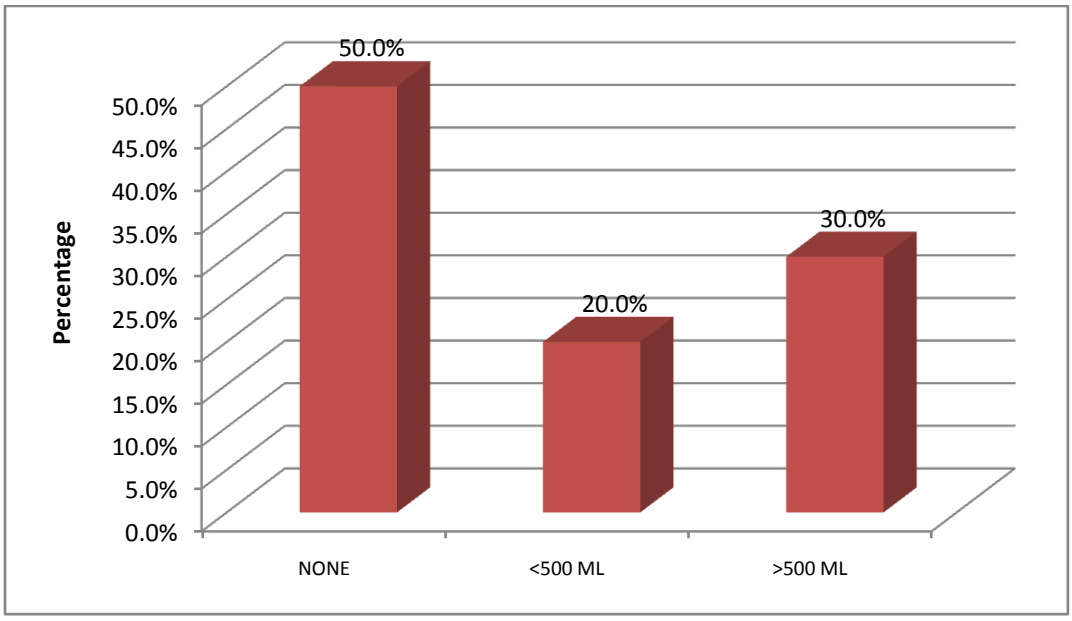

Figure 14- Intra-operative ascitic leak

ANY DILATED VEINS

Table 18- Any intra-operative dilated veins (if Yes- Ligated or not)

(IF YES- LIGATED OR NOT)	No. of cases	Percentage
NO DILATED VEINS	7	70.0%
NOT LIGATED	2	20.0%
CAUTERISED	1	10.0%
Total	10	100.0%

2 out of the 10 patients had multiple intra-operative dilated veins but not ligated. One patient had minimally dilated periumbilical perforators & veins which were cauterised.

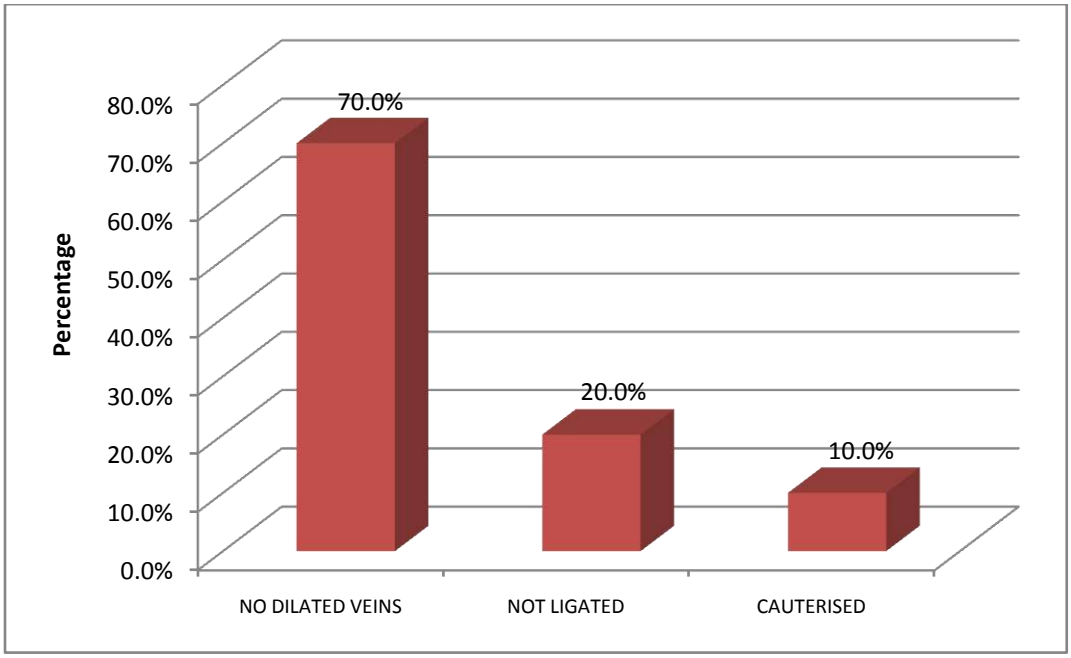

Figure 15- Any intra-operative dilated veins (if Yes- Ligated or not)

POST- OPERATIVE ICU STAY

Table 19- Post-operative ICU stay

ICU STAY	No. of cases	Percentage
YES	3	30.0%
NO	7	70.0%
Total	10	100.0%

Duration of ICU stay was 1- 2 days.

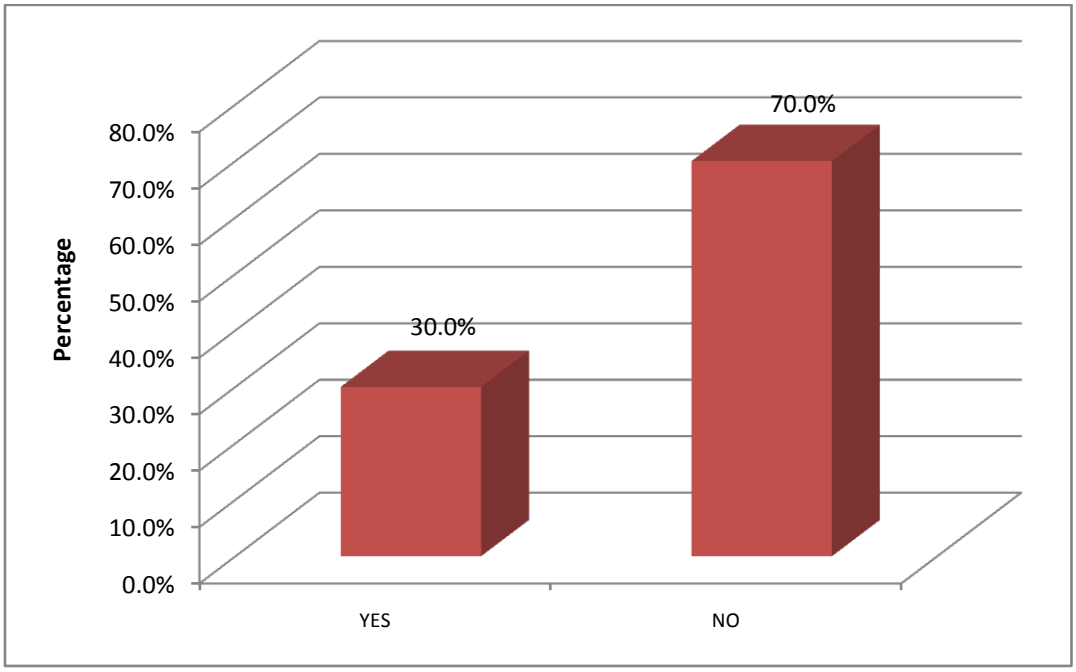

Figure 16- Post-operative ICU stay

DURATION OF INDWELLING DRAIN

Table 20- Duration of indwelling drain

TIME DURATION	No. of cases	Percentage
<3 DAYS	6	60.0%
>3 DAYS	4	40.0%
Total	10	100.0%

Average duration of drain indwelling was 3.3 days.

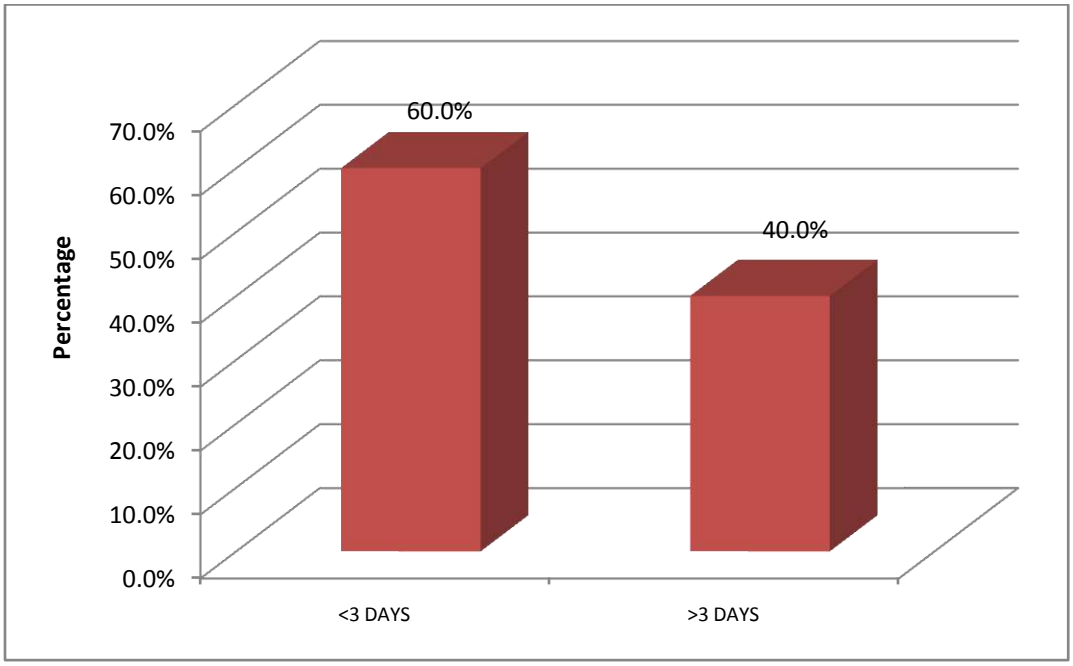

Figure 17- Duration of indwelling drain

RETURN OF BOWEL ACTIVITY

Table 21- Return of bowel activity

TIME DURATION	No. of cases	Percentage
1 DAY	5	50.0%
2 DAYS	3	30.0%
3 DAYS	2	20.0%
Total	10	100.0%

8 out of 10 patients (80%) had return of bowel activity after 48 hrs. of surgery.

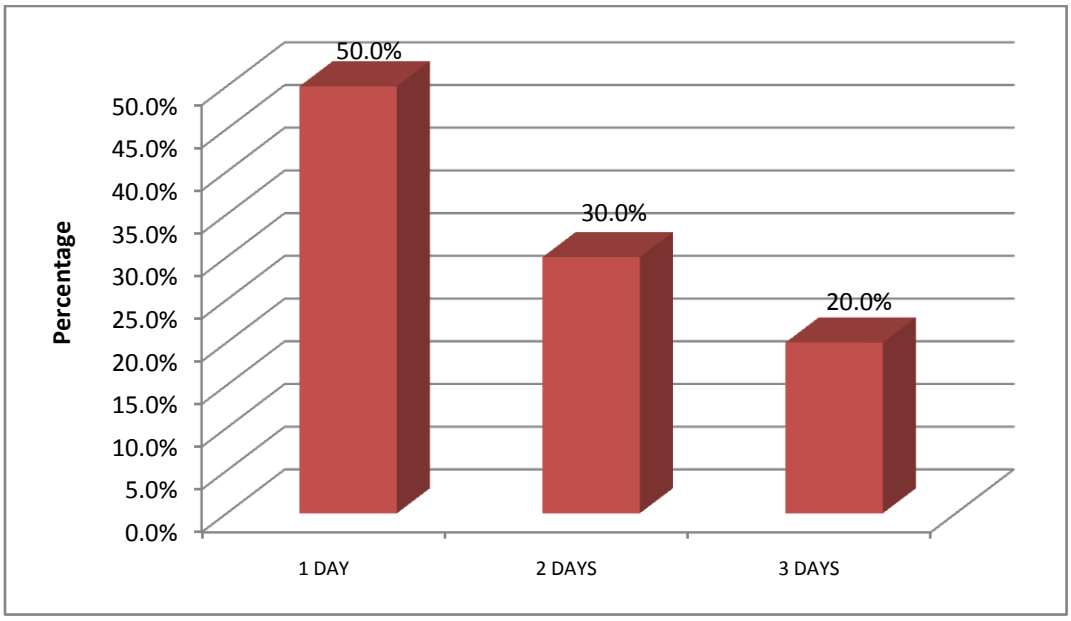

Figure 18- Return of bowel activity

DURATION OF HOSPITAL STAY

Table 22- Duration of hospital stay

Duration	No. of cases	Percentage
5 DAYS	2	20.0%
6-10 DAYS	7	70.0%
>10 DAYS	1	10.0%
Total	10	100.0%

4 out of 10 patients (40%) were discharged at 9-10th post-operative day. Average duration of hospital stay was 8.5 days.

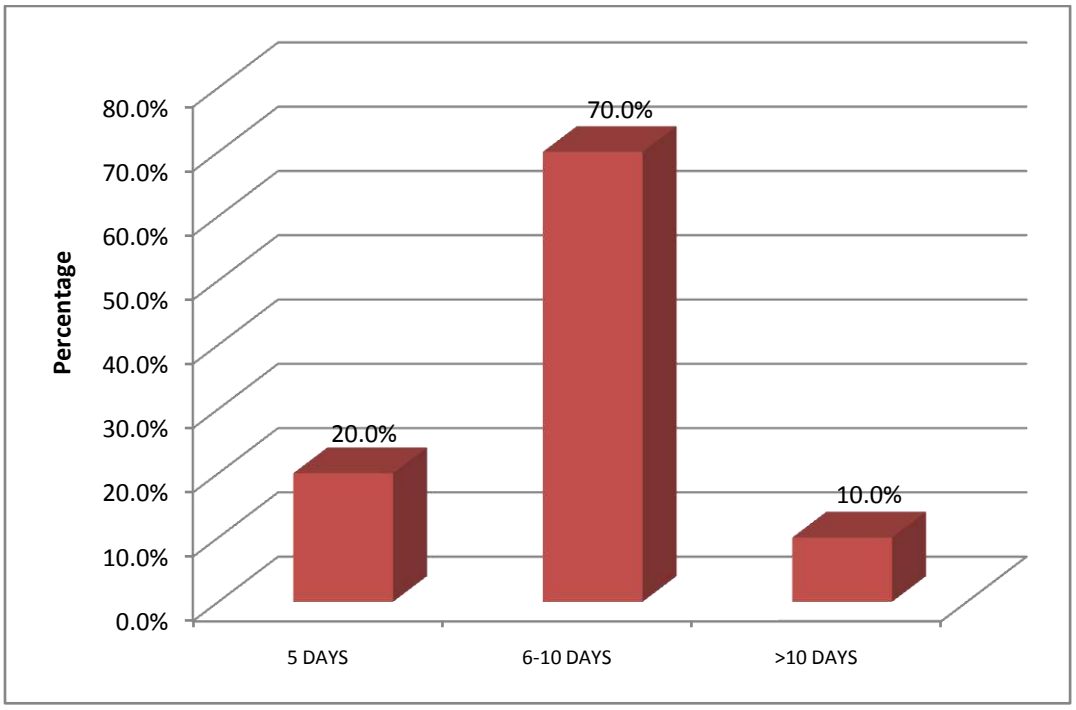

Figure 19- Duration of hospital stay

POST-OPERATIVE COMPLICATIONS

Table 23- Post-operative complications

COMPLICATIONS	0-7 DAYS	AT 1 MONTH	AT 3 MONTHS
HEMATOMA/ SEROMA FORMATION	NONE	NONE	NONE
TRANSIENT ASCITIC FLUID LEAKAGE	NONE	NONE	NONE
WOUND INFECTION & DEHISCENCE	NONE	NONE	NONE
VARICEAL BLEEDING	NONE	NONE	1 CASE
HEPATIC ENCEPHALOPATHY	NONE	NONE	1 CASE
RECURRENCE OF HERNIA	NONE	NONE	NONE

OUTCOME

Table 24- Outcome of study

OUTCOME	No. of cases	Percentage
HEPATIC ENCEPHALOPATHY	1	10.0%
VARICEAL BLEEDING	1	10.0%
NO POST OPERATIVE COMPLICATIONS	8	80.0%
Total	10	100.0%

1 out of the 10 patients died during the follow up period of study, due to post-operative variceal bleeding & liver failure. This patient had multiple dilated veins intra-operatively which were not ligated. Another 1 patient had hepatic encephalopathy 2 months after surgery, which was related to the decompensation of cirrhosis. But none of the patients had any surgical complication related to the elective umbilical hernia repair.

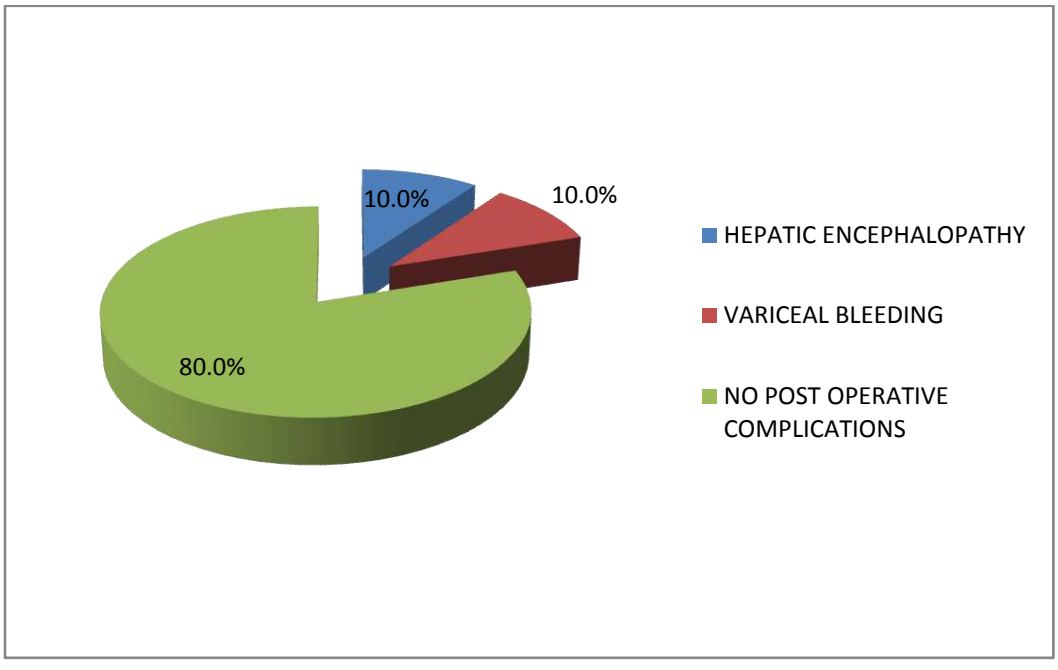

Figure 20- Outcome of study

DISCUSSION

Previous retrospective studies[18,11] have demonstrated that conservative management of umbilical hernia in patients with liver cirrhosis & ascites is associated with considerable morbidity and mortality. Later on, surgeons have been willing for elective umbilical hernia repair in cirrhotic patients. Hence, prospective study, like this one, is needed to assess the safety and efficacy of elective umbilical hernia repair in patients with liver cirrhosis and ascites.

Mean age of patients in study published by Edward T. O'HARA et al[12] (n=35) was 53 years whereas mean age of patients in study published by Byung chul Yu et al[35] (n=18) was 62.9 years. In study published by Hasan H.Eker et al[59], the median age of patients was 58.3 years. In this study, the mean age of patients was 51.7 years with median age of 54 years.

Hasan H.Eker et al[59] published a study on 30 patients, in which 25 patients were males (83%) and rest 5 were females. In study published by Byung chul Yu et al[35] on 18 patients, Eleven patients were males (61%) and seven were females. Banu P et al[53] published a study in 2013, in which male / female ratio was 2.66 /1. In this study, more than 2/3rd were males (70%) with male / female ratio of 2.33/1 (n=10).

In this study 70% of the patients underwent hernia repair within one year of the appearance of umbilical hernia.

Banu P et al[53] published a study in 2013, in which the most common etiology of cirrhosis was alcohol. Sae Byeol Choi et al[37] published a study in 2011, in which the most common etiology of cirrhosis was alcohol followed by hepatitis B and hepatitis C. In this study, also the commonest cause of liver cirrhosis was alcohol followed by the hepatitis C.

In study published by Hasan H.Eker et al[59], the mean defect size of hernia was 1.5 cms. In another study by Hassan AM et al[50], the average defect size was 3.05 cm (range 1.5- 6 cms). In this study, the mean defect size of hernia was 3.4 cms (range 1.5- 5 cms).

In study published by Hasan H.Eker et al[59], out of 30 patients 7 (23%) were pre-operatively classified as CPT grade A, 18 (60%) as grade B, and 5 (17%) as grade C. In this study, only 1 patient (10%) was classified as CPT class A pre-operatively & 9 patients (90%) were classified as class B. Also in study by Hasan H.Eker et al[59], the median MELD score was 12 (IQR, 8–16), whereas in this study the median MELD score was 14 pre-operatively with mean MELD score of 14.8. Post-operatively mean MELD score was 15.7 with median of 14.

Local or regional anesthesia were employed in eight of nine cases described by Yonemoto and Davidson[65], in 9 of 16 cases reported by Baron[39], and in 11 of 35 cases reported by Edward T. O'HARA et al[12]. The remainder received chiefly general anaesthesia. In our study, only 2 out of 10 patients had surgery under local anaesthesia.

In study published by Byung Yu et al[35] on 18 patients, average duration of surgery was 100 mins. The median operation time in study published by Hasan H.Eker et al was 79 mins. In this study, the average duration of surgery was 96.5 mins with median duration of 90 mins.

The repair of an umbilical hernia necessitates the complete freeing of the umbilical ring and the ligation of a possibly reopened umbilical vein. This reopened umbilical vein can be an important outflow for the portal circulation in patients with severe portal hypertension. If the vein is ligated during umbilical hernia repair, the outflow of the portal circulation is hampered, which can lead to acute portal vein thrombosis, subsequent acute failure of the liver necessitating emergency liver transplantation as published by Shlomovitz E et al[4] and de Goede B et al[30]. In this study, multiple dilated umbilical & periumbilical veins were seen in two patients intra-operatively and not ligated.

Arroyo et al[9], Fagen SP et al[26] and Halm et al[66] published that the incidence of recurrence after umbilical hernia repair can be diminished markedly by using mesh. All the 10 patients included in this

study underwent onlay mesh repair of umbilical hernia and none of the patient had recurrence. With the use of mesh, there are high chances of infection of the mesh due to increased ascites leakage in cirrhotics. In cases with bacterial infection of the mesh can be treated with antibiotics, and rarely may need removal of mesh. Infection of the mesh or SSI was not observed in this study. Also none of the cases had post-operative ascitic leakage from the surgical wound in this study. 1 out of the 7 patients which were excluded from study & underwent emergency hernia repair in presence of liver cirrhosis had wound infection. The SSI in other studies of umbilical hernia repair ranged from 1.8 to 19%, depending upon the presence or absence or predisposing risk factors like ascitic leakage etc.[9,26,66]

In this study, none of the patients developed the hematoma/ seroma in follow up period. On the contrary, 1 out of the 7 patients which underwent emergency hernia repair in presence of liver cirrhosis had post-operative seroma formation.

In 1901, Baron[39] reported 31% mortality rate due to bleeding esophageal varices in the post-operative period after umbilical herniorrhaphy in cirrhosis. Baron suggested that portosystemic collateral may have been compromised during the operative procedure with a resultant increase in blood flow in the coronary esophageal circuit. In this study, 1 patient (10%) had mortality due to bleeding esophageal varices more than 30 days after surgery.

In study published by Hasan H.Eker et al[59] on 30 patients, none of the patient needed post-operative ICU stay. In this study, 3 out of 10 patients needed post-operative ICU stay.

In study published by Hasan H.Eker et al[59], the median duration of hospital stay was 3 days. In this study, the median duration of hospital stay was 8.5 days. Whereas the average duration of hospital stay was 11.5 days in cases which underwent emergency hernia repair in this specific group of patients.

In 2015, Byung Yu et al[35] published that 1 patient out of 18 patients (5%) which underwent umbilical hernia repair in background of liver cirrhosis & ascites had hepatic encephalopathy in post-operative period and another 1 patient had variceal bleeding (5%) but there was no perioperative mortality. In this study, 1 out of the 10 patients had post-operative hepatic encephalopathy and another 1 patient had variceal bleeding leading to mortality of the patient (10%) more than 30 days after surgery which was not attributed to the surgical repair of hernia. Hence no peri-operative mortality seen.

4 out of the 7 patients (57%) who were excluded from the study and underwent emergency umbilical hernia repair in presence of cirrhosis and ascites died due to decompensation of liver cirrhosis in post-operative period leading to variceal bleeding or hepatic encephalopathy & ascites leakage/ SSI.

More recent studies have shown much lower mortality and morbidity rates (Table 25).

Table 25- Morbidity and Mortality reported in the literature since 1980

Author	Year	Total patients	Mortality	Morbidity
Lemmer et al.[10]	1983	9	1	2
Leonetti et al.[43]	1984	39	2	5
Pescovitz[46]	1984	22	1	18
Bunt and Mohr[67]	1985	2	0	0
O'Connor et al.[23]	1984	9	0	2
Runyon and Juler[1]	1985	22	0	4
Belghiti et al.[21]	1990	40	0	5
MacLellan et al.[68]	1990	1	0	0
Maniatis and Hunt[52]	1995	1	0	0
Ozden et al.[69]	1998	9	0	3
de la Pen˜a et al.[70]	2000	15	0	0
Granese et al.[71]	2002	1	0	0
Sarit et al.[28]	2003	1	0	0
Fagan et al.[26]	2004	3	0	0
Sherman and Lee[72]	2004	1	0	0
Slakey et al.[24]	2005	8	0	0
Total		135	4 (2.7%)	39 (21%)

A frequent theme in the literature is importance of controlling the ascites, as it relates to a successful outcome. Since ascites is commonly cited as a causative factor in the development of umbilical hernias, it follows that the presence of uncontrolled ascites postoperatively might lead to more frequent recurrences. The literature review identified three retrospective cohort studies comparing a group of cirrhotic patients who underwent repair of umbilical hernia with simultaneous interventions to the control ascites to a group who underwent hernia repair alone (Table 26). In this study, elective hernia repair was done after optimal management of ascites by the use of diuretics, nutritional support, and intravenous albumin if needed. There was no post-operative hernia recurrence in any patient in this study.

Table 26- Recurrence rates according to success in controlling ascites

Author	Year	n	Follow up (months)	Intervention for ascites	Recurrent ascites	n	Recurrent hernia
Belghiti et al.[21]	1990	40	>6	Yes	Yes	4	4
					No	10	0
				No	Yes	10	6
					No	16	1
Leonetti et al.[43]	1984	39	8-96	No	Yes	24	4
				Yes	No	15	0
Runyon & Juler[1]	1985	17	24 (mean)	Yes	Yes	11	8
					No	6	1

In conclusion, elective umbilical hernia repair, in patients with liver cirrhosis and ascites, is a safe approach in terms of less post-operative complications and low mortality. Hence elective repair seems preferable over conservative management or emergency repair of hernia in selected cirrhotic patients.

SUMMARY & CONCLUSION

1. This prospective study was conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitted with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 30th June 2019. Total 17 patients underwent umbilical hernia repair in background of liver cirrhosis and acsites during this time period. This study was conducted in 10 patients with Child Pugh Turcotte score A & B who underwent elective onlay mesh repair of umbilical hernia. Rest of the 7 patients were excluded due to emergency nature of surgery.
2. Post operatively need of ICU care, duration of indwelling drain, return of bowel activity and duration of hospital stay was noted. Also post-operative CPT Score and MELD Score was evaluated and any increase in CPT or MELD score postoperatively was noted. Outcome of the patients was noted on follow up at interval of 7 days, 1month and 3months for following post-operative complications like Hematoma/ Seroma formation, Transient ascitic fluid leakage, Wound infection & dehiscence, Recurrence of hernia, Variceal bleeding, Hepatic encephalopathy. Any Mortality up to 30 days was recorded separately.
3. In this study, more than 2/3rd were males with mean age of 51.7 years. The commonest cause of liver cirrhosis was alcohol followed by the hepatitis C. 70% of the patients underwent hernia repair within one year of the onset of umbilical hernia.
4. Only 1 patient (10%) was classified as CPT class A pre-operatively & 9 patients (90%) were classified as class B. Post-operatively 2 out of the 10 patients had deterioration in CPT score. 1 patient from pre-operative CPT class A deteriorated to post-operative class B but survived. Another one patient deteriorated from pre-operative CPT class B to post-operative class C due to portal hypertension which lead to variceal bleeding after 2 months and subsequently

died. Pre-operatively mean MELD score was 14.8 and post-operatively mean MELD score was 15.7.

5. The mean defect size of hernia was 3.4 cms (range 1.5- 5 cms). The average duration of surgery was 96.5 mins. Multiple dilated umbilical & periumbilical veins were seen in two patients intra-operatively but not ligated.
6. 3 out of 10 patients needed post-operative ICU stay. The median duration of hospital stay was 8.5 days.
7. None of the patients developed the hematoma/ seroma formation in follow up period. 1 out of the 10 patients had post-operative hepatic encephalopathy but survived and another 1 patient had variceal bleeding leading to mortality of the patient more than 30 days after surgery, which was not attributed to the surgical repair of hernia.
8. In conclusion, elective umbilical hernia repair, in patients with liver cirrhosis and ascites, is a safe approach in terms of low morbidity and low mortality. Hence elective repair seems preferable over conservative management or emergency repair of hernia in selected cirrhotic patients.

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Sr. No.	NAME	MRD NO	AGE	SEX	DATE OF ADMISSION	DATE OF SURGERY	DATE OF DISCHARGE	CHIEF COMPLAINTS	HISTORY OF PRESENTING ILLNESS	PAST HISTORY							PERSONAL HISTORY									
										MALIGNANCY	CHRONIC STEROID USE	DIABETES	HYPERTENSION	COPD	CARDIOVASCULAR	OTHERS	SMOKING	ALCOHOL ABUSE	NICOTINE/ OPOID ABUSE	HR	BP	RR	TEMP	Built	Nutrition
1	SK	427125	60	FEMALE	25/1/18	25/1/18	31/1/18	UMBILICAL SWELLING SINCE 1 YEAR	HISTORY DATES BACK TO 1 YEAR, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE. HISTORY OF PAIN ON & OFF.	NO	NO	NO	NO	NO	NO	HISTORY OF OPEN HYSTERECTOMY PRESENT	NO	NO	NO	84	130/80	20	AFEBRILE	MODERATE BUILT	WELL NOURISHED
2	RK	236905	30	MALE	28/1/18	29/1/18	6/2/2018	UMBILICAL SWELLING SINCE 4 MONTHS & PAIN ABDOMEN SINCE 7 DAYS	HISTORY DATES BACK TO 4 MONTHS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE. HISTORY OF PAIN ABDOMEN ON & OFF SINCE 7 DAYS.	NO	NO	NO	NO	NO	NO	HISTORY OF JAUNDICE PRESENT	NO	REFORMED ALCOHOLIC	NO	92	130/80	16	AFEBRILE	MODERATE BUILT	WELL NOURISHED
3	TD	117290	54	MALE	16/2/18	17/2/18	25/2/18	UMBILICAL SWELLING SINCE 2 MONTHS & PAIN ABDOMEN SINCE 1 DAY	WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE. ASSOCIATED WITH PAIN ABDOMEN SINCE 1 DAY, ON & OFF.	NO	NO	NO	NO	NO	NO	HISTORY OF TUBERCULAR ASCITES & ON ATT.	ACTIVE SMOKER	REFORMED ALCOHOLIC	NO	90	110/70	18	AFEBRILE	THIN BUILT	WELL NOURISHED
4	JS	513141	60	MALE	4/6/2018	5/6/2018	11/6/2018	UMBILICAL SWELLING SINCE 5 DAYS	HISTORY DATES BACK TO 5 DAYS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE, REDUCIBLE.	NO	NO	NO	NO	NO	NO	NO	NO	CHRONIC ALCOHOLIC	NO	77	110/70	22	100'F	MODERATE BUILT	WELL NOURISHED
5	PS	501672	40	MALE	7/9/2018	9/9/2018	15/9/18	PAIN ABDOMEN & VOMITINGS SINCE 3 DAYS	HISTORY DATES BACK TO 3 DAYS WHEN PATIENTSTARTED COMPLAINING OF PAIN ABDOMEN, MODERATE IN GRADE. ASSOCIATED WITH VOMITINGS CONTAINING GASTRIC CONTENTS. NO HISTORY OF OBSTIPATON.	NO	NO	NO	NO	NO	NO	NO	CHRONIC SMOKER	CHRONIC ALCOHOLIC	NO	74	100/70	18	AFEBRILE	MODERATE BUILT	WELL NOURISHED
6	NK	81618	52	FEMALE	31/8/18	1/9/2018	5/9/2018	UMBILICAL SWELLING SINCE 4 YEARS	HISTORY DATES BACK TO 4 YEARS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE.	NO	NO	NO	YES	NO	NO	HISTORY OF TB 6 YEARS BACK	NO	NO	NO	80	120/70	22	AFEBRILE	MODERATE BUILT	WELL NOURISHED
7	BS	64479	54	MALE	20/9/18	24/9/18	29/9/18	UMBILICAL SWELLING SINCE 1 YEAR	WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE.	NO	NO	NO	NO	NO	NO	NO	NO	REFORMED ALCOHOLIC	NO	80	130/90	20	AFEBRILE	MODERATE BUILT	WELL NOURISHED
8	GS	593573	58	MALE	10/7/2018	10/8/2018	10/12/2018	UMBILICAL SWELLING SINCE 15 DAYS	HISTORY DATES BACK TO 15 DAYS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE, REDUCIBLE.	NO	NO	NO	NO	NO	NO	NO	NO	REFORMED ALCOHOLIC	NO	78	120/80	20	AFEBRILE	MODERATE BUILT	WELL NOURISHED
9	JS	213925	56	MALE	19/10/18	22/10/18	3/11/2018	UMBILICAL SWELLING SINCE 4 YEARS	HISTORY DATES BACK TO 4 YEARS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE. HISTORY	NO	NO	YES	YES	NO	NO	NO	NO	REFORMED ALCOHOLIC	NO	84	120/70	22	AFEBRILE	MODERATE BUILT	WELL NOURISHED
10	KR	241771	53	FEMALE	30/11/18	12/4/2018	10/12/2018	UMBILICAL SWELLING SINCE 2 YEARS	HISTORY DATES BACK TO 2 YEARS, WHEN PATIENT STARTED COMPLAINING OF UMBILICAL SWELLING, SUDDEN ONSET, GRADUALLY PROGRESSIVE.	NO	NO	NO	NO	NO	NO	HYPOTHYROIDISM	NO	NO	NO	74	100/70	24	AFEBRILE	MODERATE BUILT	WELL NOURISHED

Sr. No.	NAME	MRD NO	VITALS (ON ADMISSION)								SYSTEMIC EXAMINATION				Respiratory	CVS	CNS	CLINICAL DIAGNOSIS	ETIOLOGY OF CIRRHOSIS	GENERAL EXAMINATION			
											Abdomen												
			GCS	Pallor	Edema	Icterus	Cyanosis	Lymphadenopathy	Clubbing	JVP	INSPECTION	PALPATION	PERCUSSION	AUSCULTATION						HEMOGLOBIN	TLC	DLC	PLATELETS
1	SK	427125	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 2 CMS. SCAR MARK OF PREV SURGERY SEEN.	UMBILICAL SWELLING OF 2 X 2 CMS SIZE, REDUCIBLE, NON TENDER.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH HCV RELATED CIRRHOSIS OF LIVER WITH ASCITES AND TYPE 2 DM WITH HTN.	HCV RELATED	12.3	4.8	79.5/14.2/5.7/0.4	66
2	RK	236905	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 4 X 4 CMS.	UMBILICAL SWELLING OF 4 X 4 CMS SIZE, REDUCIBLE, NON TENDER.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL RELATED CIRRHOSIS OF LIVER WITH ASCITES AND PORTAL HYPERTENSION.	ALCOHOL RELATED	10.1	8.9	65/156/10.5/82	110
3	TD	117290	E4V5M6	PRESENT	NO	NO	NO	NO	NO	NOT RAISED.	LARGE IRREDUCIBLE UMBILICAL HERNIA	LARGE IRREDUCIBLE UMBILICAL HERNIA.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL RELATED CIRRHOSIS OF LIVER WITH TUBERCULAR ASCITES AND PORTAL HYPERTENSION.	ALCOHOL RELATED	11.1	8.9	75.3/13/8.6/2.8	284
4	JS	513141	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 3 X 4 CMS.	UMBILICAL SWELLING OF 3 X 4 CMS SIZE, REDUCIBLE, NON TENDER.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH KNOWN CASE OF ALCOHOL RELATED CHRONIC LIVER DISEASE.	ALCOHOL RELATED	17.1	7.4	78.2/10.7/8.8/2	70
5	PS	501672	E4V5M6	PRESENT	-	NO	NO	NO	NO	NOT RAISED.	LARGE UMBILICAL SWELLING SEEN.	LARGE UMBILICAL SWELLING SEEN. LIVER PALPABLE 3-4 CMS BELOW SUBCOSTAL MARGIN.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL RELATED CIRRHOSIS OF LIVER WITH ASCITES AND PORTAL HYPERTENSION.	ALCOHOL RELATED	7.1	14.7	88.8/4.5/6.5/0.1	645
6	NK	81618	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 3 X 2 CMS.	UMBILICAL SWELLING OF 3 X 2 CMS SIZE, REDUCIBLE, NON TENDER.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH HCV RELATED CIRRHOSIS OF LIVER WITH ASCITES& PORTAL HYPERTENSION	HCV RELATED	9.7	2.5	64.4/22.9/ 10.8/1.6	68
7	BS	64479	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 6 X 6 CMS.	UMBILICAL SWELLING OF 6 X 6 CMS, NON TENDER. REDUCIBLE	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL/ HEP C RELATED CIRRHOSIS OF LIVER & PORTAL HYPERTENSION	ALCOHOL & HCV RELATED	10.6	5.5	71.6/12.7/9.6/5.6	53
8	GS	593573	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 4 X 4 CMS.	UMBILICAL SWELLING OF 4 X 4 CMS., REDUCIBLE, NON TENDER, COUGH IMPULSE PRESENT.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL/ HEP C RELATED CIRRHOSIS OF LIVER	ALCOHOL & HCV RELATED	9.4	5	54.4/17.6/10.8/17.1/0.1	61
9	JS	213925	E4V5M6	NO	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 6 X 6 CMS.	UMBILICAL SWELLING OF 6 X 6 CMS, NON TENDER. REDUCIBLE	TYMPANIC TO DULL NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH ALCOHOL RELATED CIRRHOSIS OF LIVER WITH ASCITES AND PORTAL HYPERTENSION.	ALCOHOL RELATED	8.4	4.6	70.5/12.6/10.6/ 6.1	64
10	KR	241771	E4V5M6	PRESENT	NO	NO	NO	NO	NO	NOT RAISED.	UMBILICAL SWELLING OF 3 X 3 CMS.	UMBILICAL SWELLING OF 3 X 3 CMS SIZE, REDUCIBLE, NON TENDER.	TYMPANIC NOTE	NORMAL BOWEL SOUNDS	BILATERAL NORMAL VESICULAR BREATH SOUND	S1S2 NORMAL	HIGHER MENTAL FUNCTIONS INTACT	UMBILICAL HERNIA WITH HEP C RELATED CIRRHOSIS OF LIVER WITH ASCITES AND PORTAL HYPERTENSION WITH KNOWN CASE OF HYPOTHYROIDISM.	HCV RELATED	10.3	3.7	59/17.5/12.6/10.6	67

Sr. No.	NAME	MRD NO	Pre- Operation												Post- Operation												
			PTI/INR	PTTK	B.UREA	S.CREATININE	B.SUGAR	Na/K/CL	T.BILIRUBIN	D.BILIRUBIN	SGOT	SGPT	T.PROTEINS	ALBUMIN	HEMOGLOBIN	TLC	DLC	PLATELETS	PTI/INR	PTTK	B.UREA	S.CREATININE	B.SUGAR	Na/K/CL	T.BILIRUBIN	D.BILIRUBIN	SGOT	SGPT
1	SK	427125	14.7/1.22	-	30	1.2	121	140/3.5/106	0.3	0.2	46	49	6.9	4.7	11.3	6.6	79.5/14.2/5.7/0.4	80	15.3/1.39	38.6	16	0.56	-	139//3.46/108	1.84	0.81	69	44
2	RK	236905	18.1/1.65	-	243	1.22	107	131/4.2/101	1.75	0.6	66	37	7.8	2.44	10.5	9	589.8/24/10.7/5.8/0.7	127	19.3/1.776	42.7	20	0.93	-	131/4.4/100	1.79	0.88	74	49
3	TD	117290	15.3/1.4	-	33	0.92	96	136/4.08	1.13	0.73	26	9	10.2	3.4	8.5	7.6	62.3/19.2/12.2/5.5	213	16.1/1.47	37.1	10	0.71	-	134/3.97/ 102	2.5	1.4	-	-
4	JS	513141	12.8/1.17	-	39	0.82	99	141/3.7/99	2.56	0.92	52	31	7.1	4.2	10.7	4.6	56.5/21.3/	91	13.4/1.2	40.8	11	0.58	-	136/3.93/107	1.26	0.48	38	22
5	PS	501672	14.8/1.35	-	74	1.4	93	132/4.6/10.1	0.78	0.32	37	12	7.1	2.7	7.3	6.5	74.6/18.6/4.0/2.4	345	20.9/1.9	43.7	45	0.96	86	132/4.4/107	2.9	1.8	33	11
6	NK	81618	14.3/1.3	-	38	0.6	83	127/4.32/97	1.93	0.57	48	38	70	2.84	10	6.4	75.8/13.1/10.6/0.5	75	17.7/1.62	36.1	42	0.96	-	121/4.21/91	1.99	0.68	39	36
7	BS	64479	15.9/1.45	42.6	21	0.78	100	140/4.17/104	2.6	1.15	35	18	7.5	3.2	8.7	3.1	92.4/3.4/4.1/0.1	41	16.8/1.52	42.6	18	0.64	-	136/4.31/101	2.4	1	22	20
8	GS	593573	13.9/1.25	-	30	1.17	115	138/4.36/102	1.02	0.48	74	34	7.3	2.8	8.9	6.4	58.4/18.6/10/16.9/0.1	65	16/1.48	39.6	35	1.06	-	137/3.8/104	1	0.38	68	44
9	JS	213925	17.2/1.57	-	30	1.14	215	136/3.84/101	1.59	0.78	41	21	7.6	2.6	7.5	2.2	83.6/6.7/9.5/0.2	62	16.2/1.48	39.6	28	0.96	127	135/3.73/106	1.31	0.45	32	17
10	KR	241771	15.4/1.41	39.8	17	0.67	93	141/4.63/106	2.36	1.05	36	26	6.5	3	10.1	5.2	90.1/6.2/3.5/0.1	76	15.5/1.42	-	15	0.54	-	137/4.22/102	1.79	0.54	37	29

Sr. No.	NAME	MRD NO			HbsAg/ ANTI-HCV/ ANTI-HIV	CHEST X RAY	USG ABDOMEN	OTHERS	CHILD PUGH TURCOTTE SCORE	MELD SCORE	CONTROL OF ASCITES	OPERATIVE DETAILS				INTRAOPERATIVE FINDINGS						POST-OPERA	
			T.PROTEINS	ALBUMIN								DATE OF SURGERY	NAME OF PROCEDURE	TYPE OF ANAESTHESIA GIVEN	DURATION OF SURGERY	DEFECT SIZE	CONTENTS	ASCITIC LEAK	INTRAOPERATIVE COMPLICATIONS IF ANY	ANY DILATED VEINS	(IF YES-LIGATED OR NOT)	NEED OF ICU CARE	DURATION OF INDWELLING DRAIN
1	SK	427125	6.7	2.4	ANTI-HCV REACTIVE	NORMAL	LIVER CIRRHOSIS WITH FEATURES OF PORTAL HYPERTENSION. MODERATE FREE FLUID. SPLEEN SIZE 13.3 CMS AND PRTAL VEIN 13MM AT PORTA.	-	6/ CLASS A	10	YES	25/1/18	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	60 MINS.	3 CMS.	OMENTUM	NO	NO	NO	-	NO	5 DAYS
2	RK	236905	7.2	2.1	NON REACTIVE	NORMAL	CHRONIC LIVER DISEASE WITH PORTAL HYPERTENSION. FREE FLUID IN PERITONEAL CAVITY. SMALL UMBILICAL HERNIA WITH DEFECT 2.7 CMS OMENTAL FAT AND ASCITIC FLUID AS CONTENT. SPLEEN 15.2 CMS AND PORTAL VEIN 15 MM AT PORTA	-	8/ CLASS B	21	YES	29/1/18	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	150 MINS.	3 CMS.	OMENTUM	1000ML	NO	NO	-	NO	5 DAYS
3	TD	117290	-	2.25	NON REACTIVE	NORMAL	CHRONIC LIVER DISEASE WITH PORTAL HYPERTENSION WITH ASCITES. SMALL UMBILICAL HERNIA WITH DEFECT 28 MM. SMALL GUT LOOPS DILATED . SUBACUTE INTESTINAL OBSTRUCTION.	-	7/ CLASS B	12	YES	17/2/18	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	90 MINS.	3 CMS.	OMENTUM AND GUT	1500ML	NO	NO	-	2 DAYS	2 DAYS
4	JS	513141	5.5	3.01	NON REACTIVE	NORMAL	FATTY LIVER GRADE III. SPLEEN SIZE 12.5 CMS. PRTAL VEIN NORMAL AT PORTA.	-	8/ CLASS B	12	YES	5/6/2018	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	12O MINS.	3 CMS.	GUT	NO	NO	NO	-	1 DAY	3 DAYS
5	PS	501672	5.8	2.4	NON REACTIVE	NORMAL	CHRONIC LIVER DISEASE WITH PORTAL HYPERTENSION WITH MILD ASCITES. THERE IS EVIDENCE OF LARGE DEFECT IN ANTERIOR ABDOMINAL WALL IN UMBLICUS REGION THROUGH WHICH GUT LOOPS, MESENTERIC FAT AND ASCITIC FLUID SEEN HERNIATING. HERNIATING GUT LOOPS SHOW NORMAL PERISTALSIS AD VASCULARITY.	-	8/ CLASS B	18	YES	9/9/2018	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	90 MINS.	5 CMS.	OMENTUM AND GUT	NO	NO	MULTIPLE DILATED VEINS	NOT	1 DAY	2 DAYS
6	NK	81618	6.7	2.61	NON REACTIVE (BY RAPID)	NORMAL	CHRONIC LIVER DISEASE WITH PORTAL HYPERTENSION. DEFECT MEASURING 25 MM SEEN IN UMBILICAL REGION WITH ASCITIC FLUID AND BOWEL AS CONTENT. SPLEE 13.5 CMS IN SIZE. LIVER 10.5 CMS IN SIZE. MODERATE ASCITES.	-	7/ CLASS B	21	YES	1/9/2018	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	60 MINS.	3 CMS.	ASCITIC FLUID ONLY	NO	NO	MULTIPLE DILATED VEINS	CAUTERISED	NO	4 DAYS
7	BS	64479	7.2	3.01	ANTI-HCV REACTIVE	NORMAL	CHRONIC LIVER DISEASE WITH MODERATE SPLEENOMEGIY	-	8/ CLASS B	14	YES	24/9/18	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	90 MINS.	4 CMS.	OMENTUM	NO	NO	NO	-	NO	3 DAYS
8	GS	593573	7.2	2.6	ANTI-HCV REACTIVE	NORMAL	LIVER CIRRHOSIS WITH PORTAL HYPERTENSION.UMBILICAL HERNIA. LIVER NORMAL IN SIZE & IRREGULAR OUTLINE. PORTAL VEIN 14 MM AT PORTA. SPLEEN MEASURES 14 CMS IN SPAN. MODERATE FREE FLUID IN PERITONEAL CAVITY. UMBILICAL DEFECT OF 14MM WITH ASCTIC FLUID HERNIIATING THROUGH IT.	-	7/ CLASS B	11	YES	10/8/2018	OPEN MESH REPAIR OF UMBILICAL HERNIA	GENERAL ANAESTHESIA	120 MINS.	4 CMS.	ASCITIC FLUID ONLY	MINIMAL	NO	NO	-	NO	2 DAYS
9	JS	213925	6.6	2.7	NON REACTIVE	NORMAL	LIVER SHRUNKEN WITH COARSE ECHOTEXTURE. PORTAL VEIN 2.3 CMS AT PORTA. SPLEEN 16 CMS ENALRGED. GROSS ASCITES.	UPPER GI ENDOSCOPY S/O PORTAL HYPERTENSION WITH SMALL ESOPHAGEAL VARICES.	8/ CLASS B	15	YES	22/10/18	OPEN MESH REPAIR OF UMBILICAL HERNIA	LOCAL ANAESTHESIA	50 MINS.	4 CMS	OMENTUM AND GUT	500 ML	NO	NO	-	NO	2DAYS
10	KR	241771	6.3	2.58	ANTI-HCV REACTIVE	NORMAL	CHRONIC LIVER DISEASE WITH PORTAL HYPERTENSION WITH MILD ASCITES. DEFECT OF 17MM IN UMBILICAL REGION WITH HERNIATION OF OMENTAL FAT THROUIGH IT. LIVER 11.3 CMS IN SIZE. PORTAL VEIN 13MM AT PORTA. SPLEEN ENLARGED- 16.8 CMS.	UPPER GI ENDOSCOPY S/O PORTAL HYPERTENSION WITH ESOPHAGEAL VARICES WITH POST EL CHANGES.	8/ CLASS B	14	YES	4/12/2018	OPEN MESH REPAIR OF UMBILICAL HERNIA	LOCAL ANAESTHESIA	75 MINS.	1.5 CMS.	OMENTUM	MINIMAL	NO	MINIMAL DILATED PARAUMBILICAL PERFORATORS AND VEINS	NOT	NO	5 DAYS

Sr. No.	NAME	MRD NO	ATIVE DETAILS		POST-OPERATIVE COMPLICATIONS																		POST-OPERATIVE CPT SCORE	POST-OPERATIVE MELD SCORE	OTHERS	TIME TO RETURN TO WORK	OUTCOME
			RETURN OF BOWEL ACTIVITY	DURATION OF HOSPITAL STAY	DURATION																						
					0-7 DAYS	1 MONTH	3 MONTHS	0-7 DAYS	1 MONTH	3 MONTHS	0-7 DAYS	1 MONTH	3 MONTHS	0-7 DAYS	1 MONTH	3 MONTHS	0-7 DAYS	1 MONTH	3 MONTHS	0-7 DAYS	1 MONTH	3 MONTHS					
					HEMATOMA/ SEROMA FORMATION			TRANSIENT ASCITIC FLUID LEAKAGE			WOUND INFECTION & DEHISCENCE			RECURRENCE OF HERNIA			VARICEAL BLEEDING			HEPATIC ENCEPHALOPATHY							
1	SK	427125	1 DAY	6 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	11	-	2 MONTHS	NO POST OPERATIVE COMPLICATION
2	RK	236905	1 DAY	9 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	20	-	1 MONTH	NO POST OPERATIVE COMPLICATION
3	TD	117290	3 DAYS	10 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	9/ CLASS B	16	-	1 MONTH	NO POST OPERATIVE COMPLICATION
4	JS	513141	2 DAYS	7 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	7/ CLASS B	14	-	10 DAYS	NO POST OPERATIVE COMPLICATION
5	PS	501672	1 DAY	8 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	10/ CLASS C	21	EXPIRED	EXPIRED	MORTALITY
6	NK	81618	1 DAY	5 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	25	-	15 DAYS	NO POST OPERATIVE COMPLICATION
7	BS	64479	3 DAYS	9 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	14	-	15 DAYS	NO POST OPERATIVE COMPLICATION
8	GS	593573	2 DAYS	5 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	11	-	20 DAYS	NO POST OPERATIVE COMPLICATION
9	JS	213925	2 DAYS	15 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	8/ CLASS B	12	-	20 DAYS	HEPATIC ENCEPHALOPATHY AT FOLLOW UP OF 3 MONTHS
10	KR	241771	1 DAY	10 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8/ CLASS B	13	-	1 MONTH	NO POST OPERATIVE COMPLICATION

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No. BFUHS/2K18p-TH/ 14152 **Date** 4/10/18

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 31.08.2018 has approved the plan of thesis of Dr. Loveleen Garg, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
A prospective study on elective umbilical hernia repair in patients with liver cirrhosis and ascites

Supervisor
Dr. Jaspal Singh
Prof. & Head,
Dept. of Surgery,
DMCH, Ludhiana.

Co-Supervisor
Dr. Ajit Sood,
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The student may submit the four copies of thesis, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Dr. S P Singh MS(Oph)
Controller of Examinations

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1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SURGERY

IN

SURGERY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

JANUARY, 2018

DR. LOVELEEN GARG

DEPARTMENT OF SURGERY

DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES
For the degree of	MS (Surgery)
Name of the candidate	Dr. Loveleen Garg
Supervisor	Dr. Jaspal Singh, Professor and Head, Department of General Surgery, DMCH, Ludhiana
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Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Umbilical hernias are common among patients with cirrhosis and uncontrolled ascites. Conservative management can be complicated by bowel incarceration, strangulation and rupture. Such conditions force emergency repair in patients who are then at a greater risk of developing complications in an emergency setting than after elective surgery.

Aim: To assess the safety and efficacy of elective umbilical hernia repair in patients with concurrent liver cirrhosis and ascites prospectively.

Material & Methods: This prospective study will be conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitting with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 31st March 2019 and after that 3 months follow-up upto 30th June 2019.

Clinical Significance: To study whether elective repair of umbilical hernia, in patients of liver cirrhosis and ascites, is safe.

Keywords: Umbilical; hernia, cirrhosis, ascites, bowel incarceration, strangulation.

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Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES"** exist in the Department of Surgery, DMC&H, Ludhiana, and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself/herself under our supervision and guidance.

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APPROVAL PROFORMA
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5	TITLE OF THE TOPIC	A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES

6. BRIEF RESUME OF INTENDED WORK:

6.1 NEED FOR STUDY

Cirrhosis results from necroinflammation and fibrogenesis of liver which occurs secondarily to different mechanisms of liver injury; histologically it is characterised by diffuse nodular regeneration surrounded by dense fibrotic septa with subsequent parenchymal extinction and collapse of liver structures, together causing pronounced distortion of hepatic vascular architecture. This distortion results in increased resistance to portal blood flow leading to portal hypertension and causes hepatic synthetic dysfunction. The main etiological factors of the disease are hepatitis virus infection and alcohol abuse. Umbilical hernia is the protrusion of abdominal contents through the anterior abdominal wall near the nevus. Umbilical hernia is a common condition with a prevalence of 2% in the general adult population.[1] Liver Failure with cirrhosis will be diagnosed on clinical, biochemical, or radiological findings and will be classified on the basis of Child Pugh Turcotte score. Ascites will be diagnosed with ultrasonography or computed tomography.

Umbilical hernias are common among patients with cirrhosis and uncontrolled ascites.[2,3] Patients with liver cirrhosis and ascites have 20% risk of developing an umbilical hernia in the course of their disease.[4] Possible factors that contribute to the development of umbilical hernia in these patients include increased intra-abdominal pressure due to ascites, weakening of the abdominal fascia and muscle wasting as a result of poor nutrition status, and dilation of umbilical vein that enlarges the preexistent supraumbilical fascial opening in patients with portal hypertension.[2]

Umbilical hernia in general population with no co-morbidities is managed surgically by performing hernioplasty in an elective setting. But in patients with cirhhotic ascites, the management has to also take into consideration the liver disease and its accompanying coagulopathy and thrombocytopenia. Umbilical hernia will be diagnosed on clinical examination and radiological findings.

Complications of these hernias in patients with liver cirrhosis and ascites can be serious, and mortality rates as high as 30% have been reported.[5] Skin ulceration and subsequent rupture of the hernial sac and leakage is common, which can result in bacterial peritonitis and serious morbidity.[3] Non-operative management of ruptured hernias with antibiotics and dressing changes may result in mortality rates in the range 60-88%.[6,7] Historically, the very high peri-operative morbidity and mortality in this patient population have precluded repair in the elective setting.[8,9] Although the incidence of umbilical hernia is high in cirrhotic patients, an optimal treatment strategy is unclear.

For many years, surgical dogma dictated a "wait and see" approach, and surgical repair of umbilical hernia was limited to patients who developed complications.[8,10] Conservative management, however, can be complicated by bowel incarceration or spontaneous rupture from necrosis of overlying skin and subsequent peritonitis. Such conditions force emergency repair in patients who are then at a greater risk of developing complications in an emergency setting than after elective surgery.[9,11] Published reports on patients with hepatic cirrhosis and ascites presenting with complicated paraumbilical hernias (including incarceration, strangulation and rupture) evaluated postoperative morbidity as high as 71%, while the mortality rate varies between 60-80% after supportive care and 6-20% after urgent surgical

repair.[5,12] This has prompted some to consider early repair [13] to avoid the need to operate in an emergency situation, where morbidity and mortality remain high.[12]

This study to be conducted in the Department of General Surgery and Department of Gastroenterology in Dayanand medical college and Hospital will assess the safety and efficacy of elective umbilical hernia mesh repair in patients with concurrent liver cirrhosis and ascites prospectively.

6.2 REVIEW OF LITERATURE

Cirrhosis is an increasing cause of morbidity & mortality in more developed countries, being the 14th most common cause of death worldwide.

Various scores have evolved from time to time to assess the severity of chronic liver disease and to predict the operative risk in patients with chronic liver disease. Child–Pugh score was firstly proposed by Child and Turcotte to predict the operative risk in patients undergoing portosystemic shunt surgery for variceal bleeding. The primary version of Child–Pugh score included ascites, hepatic encephalopathy (HE), nutritional status, total bilirubin, and albumin.

Pugh et al [14] modified the Child–Pugh classification by adding prothrombin time or international normalized ratio (INR) and removing nutritional status. Child–Pugh score has been widely used to assess the severity of liver dysfunction in clinical work.

Measure	1 point	2 points	3 points
Total bilirubin (mg/dl)	<2	2-3	>3
Serum albumin (g/dl)	>3.5	2.8-3.5	<2.8
Prothrombin time, prolongation (s)	<4	4-6	>6
Ascites	None	Mild (or suppressed with medication)	Moderate to severe (refractory)
Hepatic encephalopathy	None	Grade I-II	Grade III-IV

Child–Pugh Grade A for scoring 5-6

Child–Pugh Grade B for scoring 7-9

Child–Pugh Grade C for scoring 10-15

The Model for End-Stage Liver Disease (MELD) is a scoring system increasingly being used to assess the severity of chronic liver disease. It was initially developed to predict death within 3 months of surgery in patients who underwent a transjugularintrahepaticporto-systemic shunt (TIPS) procedure[15] and was subsequently found to be useful in determining prognosis and prioritizing for recipient of a liver transplant.[16,17]

MELD= 3.78xln [serum bilirubin (mg/dL)] + 11.2xln[INR] + 9.57xln[serum creatinine (mg/dL)] + 6.43xaetiology (0: cholestatic or alcoholic, 1- otherwise)

40 or more — 71.3% observed mortality

30–39 — 52.6% observed mortality

20–29 — 19.6% observed mortality

10–19 — 6.0% observed mortality

<9 — 1.9% observed mortality

Umbilical hernias are common among patients with cirrhosis and uncontrolled ascites.[2,3] Patients with liver cirrhosis and ascites have a risk of 20% of developing an umbilical hernia in the course of their disease.[4]

There have been several studies implicating high mobidity & mortality rates in patients of cirrhosis undergoing hernia repair. Baron in 1960 reported a mortality rate of 31% in 16 patients with cirrhosis who underwent umbilical hernia repair.[8]

O'Hara et al in 1975 reported a morbidity rate of 22% and a mortality rate of 16%, leading them to suggest that surgical repair should be delayed in uncomplicated hernias.[9]

Kirkpatrick and Schubert reported improved outcomes and lower mortality in patients treated after 1975 compared to prior to 1975.[13]

Fisher and Calkins in 1978 report that, among 21 patients with cirrhosis undergoing herniorrhaphy, there were no mortalities when the serum albumin levels was above 24 g/L.[17] It had also been suggested that the ability to control ascites may be a prognostic factor. When ascites persisted despite vigorous medical therapy, the mortality and morbidity were 5 and 30% respectively (compared to 0 and 15%, respectively, when it was possible to control the ascites).[18]

Significant reduction in morbidity and mortality has been observed following elective surgery instead of conservative management. A review by Maniatis and Hunt of papers published between 1956 and 1990 found a mortality rate of only 2% in the non-urgent setting, while the mortality rate was 14% with repair due to complications carried out as an emergency.[12]

Lemmer et al reported one mortality out of eight patients who underwent urgent operations for ruptured hernias.[5]

Leonetti et al reported two deaths out of 39 cirrhotics undergoing umbilical herniorrhaphy, but the breakdown between urgent and elective cases was not reported.[10]

The data from a series reported by Belghiti et al in 1990 that, as the severity of the cirrhotics increased, patients were less likely to be selected for elective herniorrhaphy for uncomplicated hernias.[6]

Belghiti et al compared of 26 cirrhotics (half of whom had ascites preoperatively) to 14 cirrhotics who had umbilical hernia repair and concomitant PVS insertion. The follow up duration was at least 6 months in all cases. Of the 14 cirrhotics who underwent concomitant PVS insertion, two required shunt removal due to postoperative complications and two shunts became occluded. In each of these four patients, ascites and the hernia recurred. In all, there were 14 patients who developed recurrent ascites, and ten of these (71%) developed a recurrent umbilical hernia. In contrast, there was only one recurrence in the 26 patients (4%) who did not develop recurrent ascites.[6]

Leonetti et al found a higher recurrence rate after umbilical hernia repair in cirrhotic patients with uncontrolled ascites than in cirrhotic patients with controlled ascites or in patients without cirrhosis.[10]

Pescovitz reported one operative death in a series of 22 cirrhotic patients, but it is not stated whether this was in an urgent or an elective situation.[19]

Runyon and Juler retrospectively reviewed the records of patients undergoing umbilical herniorrhaphy at their institution between 1973 and 1983. They identified 22 patients who had a history of ascites. There were no operative deaths, but morbidity consisting of wound infections and leakage of ascitic fluid from the wound occurred in 18% of patients.[20]

Slakey et al suggested that the insertion of temporarily peritoneal dialysis catheter at the end of umbilical herniorrhaphy in cirrhotic patients was effective in controlling ascites and reducing the complication rate. This approach has some advantages, such as outpatient care during the

postoperative period and easy removal of the catheter.[21] However, peritoneal catheters are associated with a high risk of bacterial infections, which significantly increase mortality and should be discouraged.[22]

A study in 2006 showed that by minimizing the access incision, the laparoscopic approach reduces postoperative pain, recovery time, and morbidity.[23]

Marsman et al in 2007 had compared elective surgical repair (n = 17) with expectant treatment (n = 13) in cirrhotic patients with umbilical hernia and ascites. The authors reported that expectant treatment was associated with elevated morbidity and mortality. Hospital admission for hernia incarceration was observed in 10 of 13 patients (77%), of which 6 needed emergency herniorrhaphy. Two patients (15%) who were subjected to expectant treatment died from hernia complications. Conversely, no complications or hernia recurrence was recorded in 12 of 17 patients (71%) who underwent elective herniorrhaphy.[11]

Modern surgical hernia repair depends increasingly on synthetic mesh for reconstruction of the abdominal wall. The use of synthetic mesh for the elective repair of umbilical hernia in cirrhotic patients proved to be safe, simple, and effective technique.[17]

Koscielny et al (2010) proposed a method of placing 2 large bore Robinson drainage tubes for 10-14 days post surgery, to facilitate adequate healing.[24]

Hassan et al in 2014 published that sublay mesh repair is safe and effective in uncomplicated cases.[25]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To assess the safety and efficacy of elective umbilical hernia repair in patients with concurrent liver cirrhosis and ascites prospectively.

7.0 MATERIALS AND METHODS

This prospective study will be conducted at Dayanand Medical College and Hospital, Ludhiana in patients admitting with umbilical hernia in presence of liver cirrhosis and ascites from 1st Jan 2018 to 31st March 2019 and after that 3 months follow-up upto 30th June 2019.

7.1 SOURCE OF DATA

Patients coming in Department of Surgery or Department of Gastroenterology of Dayanand Medical College and Hospital with umbilical hernia in presence of liver cirrhosis and ascites.

7.2 METHOD OF COLLECTION OF DATA

Inclusion Criteria:

Patients of age group 18-60 years presenting with uncomplicated umblical hernia in presence of liver cirrhosis and ascites, scheduled for elective hernia repair with Child- Pugh Turcotte score A & B.

C. Exclusion Criteria:

- Umbilical hernia in presence of liver cirrhosis and ascites complicated by obstruction, strangulation, skin necrosis and ascites leak.
- Age <18 years or >60 years.
- Patients with Child- Pugh Turcotte score C.

METHODS OF COLLECTION

1. All patients presenting to DMCH Ludhiana fulfilling the inclusion and exclusion criteria will be included in the study.
2. Patients will be educated about the study and only those patients consenting to participate in the study will be included. Written informed consent will be taken from every participant included in the study.

3. Database collection will include documentation of medical history, age, sex, vital signs, history of nicotine and alcohol use, history of chronic steroid use, history of diabetes mellitus, history of chronic obstructive pulmonary disease, cardiovascular co morbidity, viral markers, hemogram, serum bilirubin levels, serum albumin levels, blood urea levels, serum creatinine, PTI/INR, PTTK, hepatic encephalopathy, Child Pugh Turcotte classification, MELD score, presence of hernia strangulation& incarceration, duration, size of defect, overlying skin, contents whether fluid/ omentum or bowel.
4. USG abdomen will be done for size of defect, presence of any dilated umbilical veins, contents and ascites.
5. Patient with Child Pugh Turcotte score of A or B will undergo elective umbilical hernia mesh repair after optimization of ascites (with diuretics and albumin), controlling the coagulation parameters and complete preanaesthetic check up.
6. Hernia will be repaired through vertical incision. Sac will be opened at neck. Contents will be reduced back to abdominal cavity followed by excision of sac. After defining the hernial defect, the defect will be closed vertically, using Prolene No. 1 sutures, with interrupted sutures at distance of 1 cms from each other and 1.5 cms from the linea alba . A light weight, large porous, polypropylene mesh will be used for onlay mesh repair with minimum of 5 cms extending all around the defect. Mesh will be fixed with Prolene 2-0. Size of mesh will be decided on the basis of size of hernial defect. Ligation of any dilated veins if required will be done intraoperatively. All efforts will be made

intraoperatively to prevent drainage of ascites. Intraoperative complications if any will be managed accordingly and will be noted. A Drain tube will be put subcutaneously to prevent seroma formation and will be removed when last 24 hours drain output will be less than 20ml.

7. Post operatively need of ICU care, duration of indwelling drain, return of bowel activity and duration of hospital stay will be noted.
8. Post-operative CPT Score and MELD Score will be evaluated and any increase in CPT or MELD score postoperatively will be noted.
9. Outcome of the patients will be noted on follow up at interval 0-7 days, 1month and 3months for following post-operative complications:

   Hematoma/ Seroma formation

   Transient ascitic fluid leakage

   Wound infection & dehiscence

   Recurrence of hernia

   Variceal bleeding

   Hepatic encephalopathy

10. Any Mortality up to 30 days will be recorded.
11. End point of study will be at follow up of 3 months after surgery.

NUMBER OF CASES/TIME PERIOD OF STUDY

The study will be conducted at Dayanand Medical College and Hospital, Ludhiana from 1st Jan 2018 to 31st March 2019 and after that 3 months follow-up upto 30th June 2019.

OUTCOME

1. Intra-operative and Post-operative complications.
2. Post-operative CPT Score and MELD Score.

3. Post-operative mortality.

STATISTICAL ANALYSIS

Data will be described in terms of range; mean± standard deviation (±SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. For comparing categorical data, Chi square (X^2) test will be performed. Comparison of quantitative variables will be done using paired t-test. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) 17 version statistical program for Microsoft windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Yes, patients presenting included in the study will have to undergo hematological, biochemical, radiological investigations. For this patients included in the study will be informed regarding their inclusion and written informed consent will be taken for all the patients included in the study. These are however, essential for the patient management and are a part of the routine protocol for the management for umbilical hernia and liver cirrhosis with ascites.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached Along with

8. LIST OF REFERENCES

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PROFORMA

Sr. No. ___

NAME AGE/SEX

MRD NO ADDRESS

OCCUPATION MOBILE

DATE OF ADMISSION

DATE OF SURGERY

DATE OF DISCHARGE

CHIEF COMPLAINTS

HISTORY OF PRESENTING ILLNESS

PAST HISTORY

MALIGNANCY:
CHRONIC STEROID USE:
DIABETES:
HYPERTENSION:
COPD:
CARDIOVASCULAR:
OTHERS:

PERSONAL HISTORY

SMOKING:
ALCOHOL ABUSE:
NICOTINE/OPOID ABUSE:

Signature of Candidate

Signature of Supervisor

GENERAL EXAMINATION

VITALS (ON ADMISSION)

HR	BP	RR	TEMP
Built	Nutrition		
GCS	Pallor	Edema	Icterus
Cyanosis	Lymphadenopathy		Clubbing
JVP			

SYSTEMIC EXAMINATION

ABDOMEN

INSPECTION

PALPATION

PERCUSSION

AUSCULTATION

RESPIRATORY

CVS

CNS

CLINICAL DIAGNOSIS:

ETIOLOGY OF CIRRHOSIS:

Signature of Candidate

Signature of Supervisor

INVESTIGATIONS

Date					
HEMOGLOBIN					
TLC					
DLC					
PLATELETS					
PTI/INR					
PTTK					
B.UREA					
S.CREATININE					
B.SUGAR					
Na/K/CL					
T.BILIRUBIN					
D.BILIRUBIN					
SGOT					
SGPT					
T.PROTEINS					
ALBUMIN					

VIRAL MARKERS:
HbsAg/ ANTI-HCV/ ANTI-HIV:

CHEST X RAY

USG ABDOMEN

OTHERS

Signature of Candidate

Signature of Supervisor

CHILD PUGH TURCOTTE SCORE:

MELD SCORE:

CONTROL OF ASCITES:

OPERATIVE DETAILS:

DATE OF SURGERY:

NAME OF PROCEDURE:

TYPE OF ANAESTHESIA GIVEN:

DURATION OF SURGERY:

INTRAOPERATIVE FINDINGS:

DEFECT SIZE:

CONTENTS:

ASCITIC LEAK:

INTRAOPERATIVE COMPLICATIONS IF ANY:

ANY DILATED VEINS:

(IF YES- LIGATED OR NOT)

POST-OPERATIVE DETAILS:

NEED OF ICU CARE:

DURATION OF INDWELLING DRAIN:

RETURN OF BOWEL ACTIVITY:

DURATION OF HOSPITAL STAY:

Signature of Candidate

Signature of Supervisor

POST-OPERATIVE COMPLICATIONS:

DURATION	0-7 DAYS	1 MONTH	3 MONTHS
HEMATOMA/ SEROMA FORMATION:			
TRANSIENT ASCITIC FLUID LEAKAGE:			
WOUND INFECTION & DEHISCENCE:			
RECURRENCE OF HERNIA:			
VARICEAL BLEEDING:			
HEPATIC ENCEPHALOPATHY:			

POST-OPERATIVE CPT SCORE:

POST-OPERATIVE MELD SCORE:

OTHERS:

TIME TO RETURN TO WORK:

OUTCOME:

Signature of Candidate

Signature of Supervisor

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

am willing to participate in the study **"A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

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गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"A PROSPECTIVE STUDY ON ELECTIVE UMBILICAL HERNIA REPAIR IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

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ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

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ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ